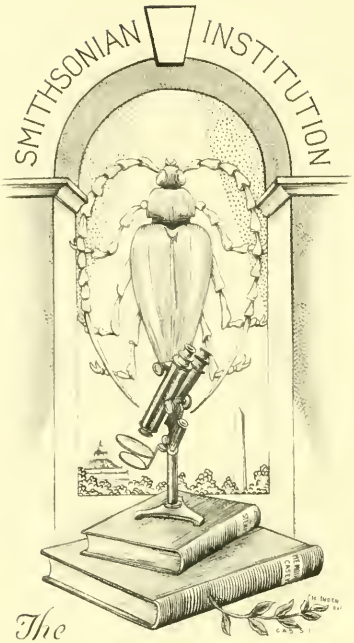

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ERRATA.

The generic name *Ankistrophorus*, used on pp. 140, 146, and 172, &c., in Lord Walsingham's Revision of the genera *Acrolophus* and *Anaphora*, is found to be preoccupied by the more correctly-spelt name *Ancistrophora*, Schin. (in the order Diptera). Lord Walsingham is therefore desirous to correct this error by substituting for *Ankistrophorus* the generic name *Homonymus*, to be used throughout his paper, and in all references to this genus.

At p. 387 for *Erebra* read *Erebia*.

At p. x of the Proceedings, for *Eupithæcia* read *Eupithecia*.

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1880 Meyrick, Edward, B.A., *Ramsbury, Hungerford, Wilts.*

1883 Miles, W. H., 5 & 6 *Hare-street, Calcutta.*

1886 Miskin, W. H., *Brisbane, Queensland.*

1879 Monteiro, Senor Antonio Augusto de Carvalho, 72 *Rua do Alecrion, Lisbon.*

1853 Moore, Frederic, F.Z.S., A.L.S., *Claremont House, Avenue-road, Croydon-road, Penge*, S.E.

1886 Morgan, A. C. F., *Villa Nova de Gaya, Oporto, Portugal.*

1869 † Müller, Albert, F.R.G.S., 195 A *Junkerstrasse, Berne, Switzerland.*

1872 † Murray, Lieut. H.

1886 Mutch, J. P., *Hornsey-road*, N.

1886 Neave, B. W., *Lyndhurst*, 95 *Queen's-road, Brownswood Park*, N.

1884 Newcombe, S. Prout, *Northcote, East Croydon.*

1887 Newman, The Rev. W. J. H., M.A., 15 *Park-crescent, Oxford.*

1878 Newman, Thomas P., F.Z.S., 54 *Hatton Garden*, E.C.

1882 Nicéville, Lionel de, F.L.S., *Indian Museum, Calcutta.*

1886 Nicholson, William E., *School Hill, Lewes, Sussex.*

1886 Norris, Herbert E., *Vine Cottage, St. Ives, Hunts.*

1878 Nottidge, Thomas, *Ashford, Kent.*

1869 Oberthür, Charles (fils), *Rennes, France.*
1877 Oberthür, René, *Rennes, France.*
1883 Oldfield, George W., M.A., F.L.S., F.Z.S., 6 *South Bank-terrace, Stratford-road, Kensington*, W.
1873 Olivier, Ernest, *Ramillons, près Moulins (Allier), France.*
1886 Olliff, A. Sidney, *Australian Museum, Sydney, N. S. Wales.*
1878 Ormerod, Miss Eleanor A., F. R. Met. S., *Torrington House, Holywell Hill, St. Albans, Herts.*
1880 Ormerod, Miss Georgiana, *Torrington House, Holywell Hill, St. Albans, Herts.*
1841 † Owen, Sir Richard, K.C.B., D.C.L., LL.D., M.D., F.R.S., F.L.S. F.G.S., &c., *Sheen Lodge, Richmond Park*, S.W.

1854 Pascoe, Francis P., F.L.S., 1 *Burlington-road, Westbourne Park, W.*
1884 Patton, W. H., *Waterbury, Connecticut, U.S.A.*
1887 Peers, John Witherington, M.A., *Wendover, near Tring Herts.*
1883 Péringuey, Louis, *South African Museum, Cape Town, South Africa.*
1879 Perkins, Vincent Robt., *Wotton-under-Edge, Gloucestershire.*
1887 Phillips, Charles Edmund Stanley, *Castle House, Shooter's Hill, Kent.*
1872 Phipson, Arthur, 3 *Gray's Inn-square*, W.C.
1881 Pim, The Rev. H. Bedford, B.A., *Leaside, Kingswood-road, Upper Norwood*, S.E.; and 97 *St. Aldate, Oxford.*
1885 Poll, J. R. H. Neerwort van der, *Amsterdam.*
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1870 Porritt, Geo. T., F.L.S., *Greenfield House, Huddersfield.*
1884 † Poulton, Edward B., M.A., F.L.S., F.G.S., F.Z.S., *Wykeham House, Banbury-road, Oxford.*
1851 Preston, The Rev. Thomas Arthur, M.A., F.L.S., *Thurcaston Rectory, Leicester.*
1876 Preudhomme de Borre, Alfred (Sec., Ent. Soc. of Belgium), 19 *Rue de Dublin, Ixelles, near Brussels.*
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1886 Rhodes, John, F.R.M.S., 360 *Blackburn-road, Accrington, Lancashire.*

1871 Riley, Chas. V., M.A., Ph.D. (Entomologist to the Department of Agriculture, and Hon. Curator of Insects), *U.S. National Museum, Washington, D.C., U.S.A.*

1853 Ripon, The Most Honourable The Marquis of, K.G., D.C.L., F.R.S., F.L.S., &c., 1 *Carlton-gardens*, S.W.

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1886 Rose, Arthur J., 2 *Linden Villas, Bedford-road, Snaresbrook, Essex, E.*

1868 Rothney, G. A. J., 15 *Versailles-road, Norwood*, S.E.

1865 Rylands, Thos. Glazebrook, F.L.S., F.G.S., *Highfields, Thelwall, Warrington.*

1885 Sabel, Ernest, F.Z.S., F.R.G.S., 6 *Grove-road, Clapham Park*, S.W.

1875 Sallé, Auguste, 13 *Rue Guy de la Brosse, Paris.*

1866 † Salvin, Osbert, M.A., F.R.S., F.L.S., F.Z.S., Vice-President, 10 *Chandos-street, Cavendish-sq.*, W.; and *Hawksfold, Fernhurst, Haslemere.*

1886 Salwey, Reginald E., *Hazeldean, Leatherhead, Surrey.*

1885 Sandars, T. C., 46 *Cleveland-square, Hyde Park*, W.

1865 † Saunders, Edward, F.L.S., Treasurer, *St. Ann's, Mount Hermon, Woking, Surrey.*

1861 † Saunders, G. S., *S. Stephen's Lodge, Canterbury.*

1886 Saunders, Prof. Wm., *London, Ontario, Canada* (President of the Entomological Society of Ontario).

1881 Scollick, A. J., *Albion Lodge, Putney*, S.W.

1886 Scudder, Samuel H., *Cambridge, Mass., United States.*

1875 † Sealy, Alfred Forbes, *Cochin, South India.*

1864 Semper, George, *Altona.*

1862 Sharp, David, M.B., C.M., Edin., F.Z.S. President, *Bleckley, Shirley Warren, Southampton.*

1883 Shaw, A. Eland, 13 *Lanhill-road, Paddington*, W.

1883 † Shelley, Capt. George E., F.Z.S., 13 *Rutland Gate*, W.

1887 Sich, Alfred, *Burlington Lane, Chiswick*, W.

1887 Sidgwick, A., M.A. (Fellow of Corpus Christi College, Oxford), *Woodstock-road, Oxford.*
1877 Slater, John Wm., 36 *Wray-crescent, Tollington Park*, N.
1883 Smith, Frederick W., *Hollywood, Lewisham Hill*, S.E.
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1885 Smith, Sidney Philip, 22 *Rylett-road, Shepherds Bush*, W.
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1882 Swanzy, Francis, *Stanley House, Granville-road, Sevenoaks.*
1884 Swinhoe, Lieut.-Col. Charles, F.L.S., F.Z.S., *Bombay Staff Corps, Commissariat Department, Bombay, India.*
1876 Swinton, A. H., *Lansdowne, Danes Park, Ramsgate, Kent.*

1886 Theobald, F. V., *Chestnut Avenue, Kingston-on-Thames.*
1856 Thomson, Jas., 12 *Rue de Presbourg, Place de l'Etoile, Paris.*
1882 Todd, Richard, 5 *Princes-terrace, Bayswater*, W.
1859 † Trimen, Roland, F.R.S., F.L.S. (Curator of South African Museum), *Cape Town, Cape of Good Hope.*
1886 Tutt, J. W., *Rayleigh Villa, Westcombe Park, Blackheath*, S.E.

1869 Vaughan, Howard W. J., 11 *Ospringe-road, Brecknock-road*, N.W.; and 55 *Lincoln's Inn Fields*, W.C.
1866 Verrall, G. H., *Sussex Lodge, Newmarket.*

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1870 Walker, The Rev. Francis Augustus, D.D., F.L.S., *Dun Mallard, Cricklewood*, N.W.
1878 Walker, J. J., R.N., 23 *Ranelagh-road, Marine Town, Sheerness.*
1863 † Wallace, Alfred Russel, F.L.S., F.Z.S., &c., *Nutwood Cottage, Frith Hill, Godalming.*

1866 † Walsingham, The Right Hon. Lord, M.A., F.R.S., F.L.S., F.Z.S., &c., *Eaton House*, 66 A *Eaton-square*, S.W.; and *Merton Hall, Thetford, Norfolk.*

1886 Warren, William, M.A., *Merton Cottage, Cambridge.*

1869 Waterhouse, Charles O., *British Museum, South Kensington*, S.W.; and *Ingleside, Avenue Gardens, Acton*, W.

* Waterhouse, George R., F.Z.S., &c., *Curton Lodge, Werter-road, Putney*, S.W.

1845 Weir, John Jenner, F.L.S., F.Z.S., *Chirbury, Beckenham, Kent.*

1876 † Western, E. Young, 27 *Craven Hill Gardens, Bayswater*, W.

* Westwood, John Obadiah, M.A., F.L.S. (Professor of Zoology in the University of Oxford), Honorary Life President, 67 *Woodstock-road, Oxford.*

1882 Weymer, Gustav, 67 *Ost-strasse, Elberfeld, Rhenish Prussia.*

1886 Wheeler, F. D., M.A., *Paragon House School, Norwich.*

1868 † White, F. Buchanan, M.D., F.L.S., *Annat Lodge, Perth*, N.B.

1865 White, The Rev. W. Farren, M.A., *Stonehouse Vicarage, Gloucestershire.*

1884 White, William, 4 *Mecklenburgh Square*, W.C.

1882 Williams, W. J., *Zoological Society, Hanover-square*, W.

1874 Wilson, Owen, *Cwmffrwd, Carmarthen.*

1881 Wood, Theodore, *Freeman Lodge, St. Peter's, Thanet, Kent.*

1886 Young, Morris, *Free Museum, Paisley.*

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THE

TRANSACTIONS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

FOR THE YEAR 1887.

I. Cecidomyia destructor, *Say, in Great Britain.*

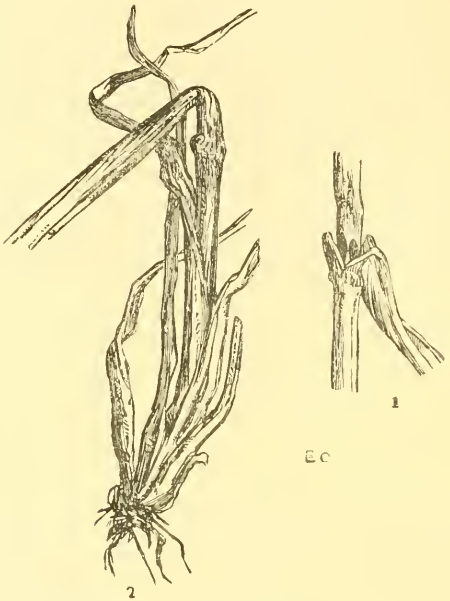
By ELEANOR A. ORMEROD, Consulting Entomologist to the Royal Agricultural Society of England.

[Read December 1st, 1886.]

As I have now completed the series of observations from life of the *Cecidomyia destructor*, Say, in Great Britain, I beg to offer a short account of my procedure. I submitted my early specimens and my opinions to our much honoured Life President, Prof. Westwood, whom I knew to be in possession of specimens, and who did me the favour to examine the injured corn and the characteristic puparia forwarded, and to confirm my determination. A short history of the attack is as follows :—

On the 28th of July I received specimens from Revell's Hall, Hertford, of injured barley, which on examination precisely corresponded with the condition caused by attack of the *Cecidomyia destructor*, commonly known as the Hessian Fly. On investigation on the spot I found the puparia fixed beneath the sheathing-leaf just above the second joint, in the manner described

as characteristic. They were laid lengthwise along the stem, and frequently firmly attached at one extremity,



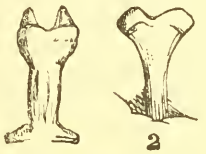
Attacked barley-stems; 1, puparia, *in situ*; 2, stem bent down.

which adherence is caused by the larva lying so motionless at the spot at which it is feeding that the stem slightly advances round the point of attachment.

For the various works of authority which I consulted on the subject I refer you to my recently-published pamphlet, which is in the hands of many members of our Society, as they are too numerous to be quoted here.

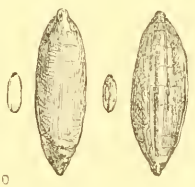
On the dissection of the puparia I found the larva within still little changed, and was able to identify it as a Cecidomyideous larva, and likewise as corresponding with that of the *C. destructor* in the very peculiar form of its anchor process, which, though roughly, is clearly shown in Dr. Packard's paper on Hessian Fly (formed in connection with Prof. Riley, Dr. Cyrus Thomas, and other personal observers of the attack, published in the 'Third Report of the United States Entomological Commission, 1880'). I shall perhaps be excused in

mentioning that I have devoted especial attention to the study of Cecidomyideous larvæ and the form of the anchor process for some years; the subject was therefore one with which I was conversant. The peculiar alteration in colour of the larva in this early stage of partial pupation was also what is described by Dr. Wagner, and accounted for by him as the result of the formation of adipose matter. In a more advanced stage the colouring further changed to that stated to accompany the first development of the parts of the embryo imago.



Anchor process of *C. destructor*, and 2, of *C. tritici*; both mag.

To return now to the larval contents of the puparium. The form of this corresponded with the very exceptional form of that of the *C. destructor*. It resembled a flax-seed so nearly that on mixing flax-seeds and puparia together it was impossible at a glance to detect the difference. On more minute examination the figures of the puparia were narrower, and, though they had the flattened form of the flax-seed, they were distinguishable by one extremity having a mark across, as if it had been pinched in, the other being slightly bent forward. These appearances are characteristic of the *C. destructor* puparium at this stage. At first (as it was an early condition of pupation) I did not find the longitudinal striæ; the outer skin, which had changed to chestnut-brown of lighter or darker tints, according to its age, still preserved the slight transverse markings, showing the divisions of the segments in the larval state. As the colour deepened the striæ appeared, and were clearly visible running longitudinally from one extremity to the other, in the manner shown in my own figure from life sent, accompanying.

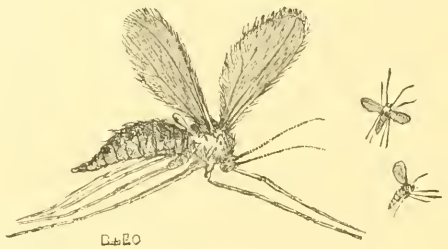

Puparia, nat. size and magnified.

As I was unwilling to rest on my own opinion in such an important matter, I forwarded specimens of the infested stems to our Life-President, and trust I shall not be out of order in giving his own words. After thanking me for details, &c., of "Attack of the Hessian Fly," he wrote—"There can be no doubt that

such is really the true 'Simon pure'; more's the pity." On sending further specimens Prof. Westwood wrote, with regard to these "stems, and the puparia of the Hessian Fly:—The latter agree exactly with Austrian specimens I received from M. Lefèbvre many years ago, sent to him by Dr. Hammerschmidt, of Vienna."

I further forwarded specimens and full details to Prof. W. Saunders, President of the Entomological Society of Canada, whose entomological position is too well known to require any observation from myself, and who was eminently qualified from personal scientific and practical knowledge of the attack to offer an opinion, and from him I received the statement:—"The wheat-stem pests, enclosed in your letter, which are embedded in the stalks of the wheat, are without doubt the true Hessian Fly in its pupal condition, known as the flax-seed state." I may add that in his presidential letter to the Entomological Society of Ontario, recently delivered by Prof. Saunders, he officially announced the appearance of the Hessian Fly in Great Britain from my specimens and details, my letter of detail being read by Mr. James Fletcher, the Consulting Entomologist of the Department of Agriculture of the Dominion.

In regard to development of the imago and determination of the same:—On the 8th of September an excellent specimen developed. By forming a long wand of twisted paper and moistening the tip with a little chloroform I secured the imago without injury, and



Imago of *C. destructor*, nat. size and magnified.

also still so far alive that I was able to watch it through the changes of tint, described by Dr. Wagner, from a golden brown, through the shades of mulberry with transverse black bands above on the first six segments

of the abdomen, on to the general development of brown tints of the abdomen, in which the difference of appearance of the black velvety spots on the sides of these segments disappear, and the black transverse bands are not very noticeably different in colour. The antennæ and tarsi, and all points that it was possible for me to examine, precisely corresponded with those of *C. destructor*,—I do not say with the description of this or that observer, as in a case of this enormous importance I examined into the points of all the best descriptions, and, where the points were not clear, tabulated the descriptions in parallel columns that I might be absolutely certain. The only point in which I found a marking not recorded in the descriptions is, that when I placed the specimen upright, so as to have a view of the upper part of the abdomen, I observed a minute marking, like a V, with a small line on each side of it, which marking was placed in somewhat darker or greyer tint than the yellowish colour of the segments on a portion of the 7th and 8th segments of the abdomen. This slight marking, it is unnecessary to say, is not material to specific differentiation.

Above I have mentioned that I found the imago corresponded with that of *C. destructor* in all points in which I was able to make comparison, because I did not feel that I could be certain of the presence or non-presence of the lamellæ at the extremity of the ovipositor, which are important points in identification. I therefore forwarded the same specimen to Mr. R. H. Meade, of Manningham, Bradford, who was good enough to examine into the matter, and ascertain clearly that the *lamellulæ* were *not* present.

To those who are acquainted with the characteristics of *C. destructor*, it will be of interest to know that in this point, in the pediculated joints of the antennæ, in the terminal joint of the antennæ of the female being half as long again as the penultimate, and in minute points of the neuration of the wings, the imago which I developed from the British puparia precisely agreed with the description to be gathered by collation of the points of structure, as well as colour given, by the entomological writers of the U.S.A., Canada, and of such of the chief European writers as I have quoted above or had the opportunity of consulting.

Once again, with regard to confirmation, I may be permitted to say that, after minute examination of the imago, I was favoured by Mr. R. H. Meade with the distinct statement :— " I have no doubt whatever about your insect being *Cecidomyia destructor* " ; and further on in his letter, after giving me point by point the results of his examination, he adds :—" I have no doubt that the real Hessian Fly has made its appearance here."

Since this letter I have had the opportunity of submitting my whole series of specimens to Mr. John Marten, of Albion, Illinois (who, whilst Dr. C. Thomas was State Entomologist of Illinois, was one of his assistants). As it is from the work of Dr. C. Thomas that the paper on Hessian Fly, published by the Entomological Commission of the U.S.A., is stated by Dr. Packard to be mainly formed, and Mr. J. Marten (Dr. Thomas's assistant) has especially devoted himself to the study of this insect, his opinion is one of much value. I am now able to mention from personal examination that in every condition, from that of slightly-changed larva up to imago, which I have watched through all its changes of colour, the insect under discussion corresponds with the *Cecidomyia destructor* of Say ; that the injury to the corn-stalks also corresponds exactly ; and, further, that I have received confirmation on these points on personal examination of my specimens from the high authorities mentioned above. To this I may add that the work of the later brood has also now, or up to my last communication, appeared on the self-sown or late-sprouted plant, as described in the States.

II. *Descriptions of some new species of* Brachycerus.

By Francis P. Pascoe, F.L.S., &c.

[Read February 2nd, 1887.]

Plates I. & II.

The number of described species of *Brachycerus* is about 260, by far the greater part being from South Africa, and apparently south of the Tugela River. They are, on the whole, tolerably distinct, but, owing principally to their sculpture, not easy to describe in words that should be unmistakably intelligible. Very few species are figured, and as Schönherr's types, obtained by him just forty-seven years ago, belonged to several collectors, many may now have disappeared; but the types of the "Coleoptera Caffrariæ" are, I believe, at Stockholm. It is probable that some species here described may not be new; if so, I hope the figures herewith will compensate for the addition of useless synonyms, for I believe very little will be gained, in a genus such as this, by mere descriptions, except for isolated forms.*

This genus of weevils, easily recognisable at sight, is not to be absolutely defined, and is another instance that good generic characters in one group may be only of specific value in another. Thus there may be or not be a scutellum; ocular lobes the most pronounced or not a vestige of them; straight or sinuated tibiæ armed or unarmed; a spined, angular, or a round-sided prothorax; corbels of the posterior tibiæ evident or not distinctly apparent, &c. Nor is there a sign of any correlation of these characters with others. Consequently, if the genus is broken up, as Lacordaire asserts it ought to be, the number of genera will not be

* For the thirteen European species, admitted by Stein and Weise, there are forty-three synonyms; this shows the difficulty, even allowing for a certain amount of variation, of recognising the species from descriptions only.

very far short of the number of species.* Schönherr's divisions of the genus include the most dissimilar forms. I have here arranged the species without reference to their affinities.

Although so numerous in species they appear to be individually scarce. Collectors at the Cape seem to have paid very little attention to their habits, but, judging from the few species of the Mediterranean region, the larvæ will probably be found feeding in the bulbs of the *Amaryllideæ* and allies, which abound in the Cape Colony, the perfect insects only emerging for a short time to prepare for another generation.

The measurements are taken from the apex of the prothorax to the declivity of the elytra. Characters common to the whole genus are mostly omitted.

Brachycerus cinnamomeus. (Pl. I., fig. 1).

B. oblongo-ovatus, squamosit ate cinnamomea, granulis tubercu lisque adspersis, tectus; rostrum modice elongatum, antice spatio triangulari notatum; prothorax utrinque acute spinosus, apicem versus fovea magna impressus; elytra ovata, singulo tuberculis validis triseriatim obsitis, interstitiis nitide granulatis. Long. 10 lin.

Hab. Zanzibar.

A comparatively large species, which may be approximated to *B. annulatus*, Gerst. The upper parts are covered with a cinnamon-brown squamosity, with a few lighter spots on the elytra, and are marked by glossy granules and tubercles. Rostrum moderately long, anteriorly bounded by two ridges forming a triangular impression between them, the posterior part marking off the rostrum from the head: no ridge over the eyes: prothorax sharply spined at the sides, the disc with glossy granules irregularly placed and varying in size and shape, towards the apex a large and somewhat shallow pit; elytra ovate, each with three rows of tubercles, the sutural and intermediate with depressed tubercles, those near the suture much the smallest, the intermediate gradually smaller on the declivity, the outer row is composed of conical tubercles, except that the last two are spiniform, in the intervals of the tubercles many small glossy black granules: legs

* Bedel has separated *B. porcellus* as a genus under the name of *Herpes*; Dr. Aurivillius has proposed *Gyllenhallia* for *B. spectrum*. *Theates*, Fahr., is closely allied to *Brachycerus*.

covered with numerous granules, the intervals squamose and setiferous; tarsi robust.

Brachycerus suturalis. (Pl. I., fig. 2).

B. oblongo-ovatus, fuscus, regione suturali dense albido-squamoso; rostrum modice elongatum, basi bituberculatum; prothorax globosus rude punctatus, apice tumidus; elytra ovalia, apice singulorum calloso, supra lineis elevatis nodulosis instructa. Long. 6 lin.

Hab. Algoa Bay.

This species has a comparatively narrow outline; the upper part is pitchy, with a sprinkling of minute whitish scales, but a patch on the shoulders and the sutural region densely covered with larger scales. Rostrum moderately elongate, slightly concave and punctured in front, the base with two erect tubercles, the head separated by a deep depression; prothorax raised much above its base, rounded and tuberculate at the sides, disc rudely and irregularly punctured, and a deep depression behind the apex; elytra slightly rounded at the sides, on each five rows of raised nodulose lines, the intervals lightly pitted, three round spots composed of short densely packed hairs along the basal half of the third line, a smooth callus at the apex of each elytron; body beneath and legs reddish brown, clothed with small silvery scales; tarsi moderately stout.

Brachycerus eximius. (Pl. I., fig. 3).

B. oblongo-ovatus, nigro-tuberculatus, squamositate cinnamomea, luteo-plagiata, ornatus; rostrum breviusculum, basi bituberculatum, antice punctis sparsis impressum; prothorax elevatus, apice in lobis duobus producto; elytra tuberculata, regione suturali maculis conspicuis lacteis ornata. Long. 6 lin.

Hab. Cape.

A very pretty species with black glossy tubercles studding the upper parts, the intervals clothed with a cinnamon-coloured squamosity, varied by a narrow median stripe and a short lateral one on the prothorax, and three nearly connected milk-white patches on the sutural region, extending from the base to the apex. Rostrum short, not stout, two approximate tubercles towards the base, the head marked off by a narrow line; prothorax raised much above its base, tuberculate, each tubercle with a glossy granuliform tip, the apex bifid and projected on the head, the eyes lying beneath; elytra slightly rounded on the sides, punctures on the scutellar region filled with scales, sides with glossy mammilliform tubercles, each tipped with a recumbent seta; body beneath

and legs closely covered with cinnamon-coloured scales; tarsi moderately stout.

Brachycerus disjunctus. (Pl. I., fig. 4).

B. sat breviter ovatus, saturate fuscus, scutello, suturæ basi, macula triangulari et alteris duabus apicalibus, humerisque dense niveo-squamosis; prothorax cum elytris fortiter tuberculatus. Long. $3\frac{1}{2}$ lin.

Hab. Damara-land.

A small dark brown or nearly black species, with a conspicuous white triangular spot just behind the middle of the elytra. Rostrum not marked off from the head, somewhat elongate, comparatively narrow, the base with two oblong ridges—nearly continuous with those above the eyes—and between them a deep depression; prothorax about as long as broad, broadly grooved throughout, the apex with two conspicuous tubercles; elytra somewhat globose, about twice the length of the prothorax, each with three rows of large conical tubercles, the intervals strongly pitted, sutural line at the base, a large triangular spot behind the middle, a still larger oblong spot at the apex on each side, and the shoulders covered with white scales; last three segments of the abdomen black; legs with black setæ.

Brachycerus capito. (Pl. I., fig. 5).

B. brevis, squamositate pallide grisea tectus; rostrum crassum, gibbosum, apice bituberculatum, a capite sulco profunde disjunctum; prothorax brevis, rude irregulariter impressus, lateraliter rotundatus et tuberculatus; elytra subglobosa, tuberculis mammilliformibus lineatim instructa. Long. 5 lin.

Hab. Cape.

A short, thick-set, pale greyish species, with a broad head and large eyes, each lying under a horizontal ridge. Rostrum separated from the head by a deep groove, thick gibbous or curved in front, reticulately pitted, and the apex bituberculate; prothorax short, roughly and irregularly pitted, sides rounded, apex truncate, and ocular lobes prominent; scutellum transversely triangular; elytra nearly globose, scutellar region strongly reticulate, the sides and posterior half with prominent mammilliform tubercles, each tipped with from one to three or four setæ; first abdominal segment, except its interfemoral process, not observable; legs with longish setæ, as well as the abdomen; tarsi elongate.

Brachycerus omissus. (Pl. I., fig. 6)

B. sat breviter ovatus, squamositate laxa fusca vestitus ; rostrum breve, in medio leviter excavatum, caput supra oculos fortiter cristatum; prothorax rugoso-punctatus, lateraliter spinosus ; elytra ampliata, irregulariter foveata, postice et ad latera tuberculata. Long. 5½ lin.

Hab. Damara-land.

Somewhat like *B. subfasciatus*, Gyll., but differing in rostrum, sculpture, &c. Rostrum short, largely but not deeply excavated in front, not marked off from the head, an oblong ridge above the eyes, which are nearly covered in repose by the large ocular lobes ; prothorax rather broader than long, rounded at the apex, irregularly rugose above, the sides with a conspicuous conical tubercle ; elytra subglobose, strongly pitted, the intervals at the sides, and especially on the declivity, raised into conical tubercles, each of which are tipped with a short seta; legs with pale ashy and brownish scales; tarsi rather short. The upper parts are covered with a sparse ragged squamosity mixed with a few minute scales.

Brachycerus rixator. (Pl. I., fig. 7).

B. oblongo-ovatus, nigrescens; rostrum vix elongatum, basi constrictum et alte bicornutum, inter oculos adscendens ; prothorax transversus, apice producto et incrassato, lateraliter tuberculatus ; elytra lineatim tuberculata, interstitiis foveis quadratis impressis. Long. 9 lin.

Hab. Damara-land.

A dark-coloured, middle-sized species, rather depressed above, with a very pale greyish squamosity. Rostrum moderately long, narrow at the base, continued to the vertex, and conspicuously raised between the eyes, at the base an elevated spiniform tubercle on each side, expanding towards the apex into a large triangular process ; prothorax transverse, nearly as broad as the elytra, produced and rounded at the apex, covered with numerous glossy granules, but leaving a slight trace of a median groove, on each side three or four tubercles: elytra moderately rounded at the sides, each with about six rows of rather small tubercles, the interstices with well-marked quadrangular pits, the suture on each side with a row of granules, tubercles on the third row raised and crowded at the base, leaving the scutellar region depressed ; body beneath and legs covered with pale greyish or whitish scales ; tarsi elongate.

B. lobaticollis, Per., seems—from the figure—to be allied to this species.

Brachycerus Faustii. (Pl. I., fig. 8).

B. oblongo-ovatus, plerumque squamositate obscure grisea tectus; rostrum breviusculum, antice paulo excavatum, apice bifoveatum, basi bilobatum, a capite distinctum; prothorax cum elytris carinatis, his apice dehiscentibus. Long. 12 lin.

Hab. Natal.

In facies somewhat like the next, but more allied to *B. oblongus*, Fhrs. Rostrum rather short and narrow comparatively, slightly concave in front, the apex with two conspicuous pits, the base bilobed, the lobes clearly marking it off from the head; prothorax transverse, angularly spined at the sides, three ridges on the disc, the middle one smallest; elytra broader than the prothorax, each with a slightly flexuous ridge on the basal half replaced by a line of setiferous tubercles nearly to the apex, at the side a raised nodulose line, and toward the margin three or four flattish tubercles, the sutural region nearly impunctate, intervals of the ridges closely covered with a dull greyish squamosity, that between the first and second with a finely raised line, each apex prolonged and divergent; body beneath and legs covered with dull greyish scales; inner angle of the posterior tibiæ with an acute curved spine; tarsi rather elongate.

Named after M. Johannes Faust, of Libau, Courland, who has done so much for the insect-fauna of Russia and Turkestan.

Brachycerus præcursor. (Pl. I., fig. 9).

B. oblongo-ovatus, niger; rostrum cum capite continuatum; prothorax costis duabus validis, elytra quatuor, instructi, interstiis squamositate albida dense tectis. Long. 8 lin.

Hab. Cape.

This species is like the figure given by M. Peringuey of his *B. albotectus*, but differs from his description in several important particulars. Rostrum continuous with the head, moderately long and comparatively narrow, flattish in front, scarcely narrower at the base and reticulately punctured; prothorax transverse, gradually expanding into an acute angle at the sides, disc with two elevated glossy black ridges, between which is a smaller ridge, but covered, as is the rest of the prothorax, with a whitish squamosity; no ocular lobes; scutellum small but distinct; elytra nowhere scarcely broader than the prothorax, each with a ridge continuous with the one on the prothorax, but only extending midway and replaced by

a line of setiferous tubercles nearly to the apex, a shorter ridge outside, and then a few tubercles more towards the outer margin, the intervals with the same kind of squamosity as on the prothorax; abdominal segments, except the first, dark brown, the sterna and legs densely covered with ivory-like scales; tarsi slender, but the last joint distinctly stouter.

Brachycerus phlyctænoides. (Pl. I., fig. 10).

B. oblongo-ovatus, niger, supra granulis nitidis confertim tectus; rostrum gibbosum, postice bilobum, antice supra planatum et rude punctatum; prothorax transversus, apicem versus canaliculatus, utrinque leviter tuberculato-angulatus; elytra ovata, irregulariter granulata. Long. 13 lin.

Hab. Guinea.

A large black scaleless species, with numerous glossy granules above, many of them—especially on the prothorax—with a small central puncture. Rostrum moderately long, gibbous and roughly punctured in front, bilobed at the base, and separated from the head by a well-marked curved groove; prothorax not much broader than long, the apex slightly produced and rounded, the middle with a groove well marked anteriorly, granules very irregular on the disc, smaller at the sides, except one more prominent and tuberculiform; elytra ovate, granules somewhat flattish, irregular, the intervals punctate; legs punctured, many of the punctures with a small granule; tibiæ slightly bisinuate; posterior tarsi with the terminal joint as long as the rest together.

Brachycerus albicollis. (Pl. II., fig. 1).

B. oblongus, fusco-brunneus, squamosus, albo-signatus; prothorax latus, lateraliter tuberculatus, antice albo-squamosus et fere impunctatus; elytra ovata, prothorace paulo latiora, tuberculata; tarsi modice elongati. Long. 4½ lin.

Hab. Natal ?.

A small brownish species having the anterior half of the prothorax and head covered with white scales, as well as a large triangular spot on the elytra. Rostrum moderately long, roughly punctured, the base with two oblong oblique contiguous lobes marking it off from the head; prothorax broad, convex, each side with a small obtuse tubercle, the apex with a quadrate impression, anterior half, or white portion, nearly impunctate, the posterior half coarsely pitted, the intervals more or less raised into tubercles, each mostly with a glossy black flattish top; scutellum distinct, white; elytra

ovate, rather broader than the prothorax, with tubercles principally in three rows, the inner row confined to the declivity, tubercles not prominent, each with a glossy black top, the intervals lightly pitted; legs and body beneath closely scaled, the former with decumbent black setæ; tarsi of moderate length.

Brachycerus electilis. (Pl. II., fig. 2).

B. oblongus, squamosus, rufo-brunneus, albo-signatus; prothorax latus, lateraliter rotundatus, disco cruciatim impressus; elytra prothorace vix latiora, brevia, supra foveatim corrugata et tuberculata; tarsi breves. Long. 4½ lin.

Hab. Algoa Bay.

A small rufous-brown species with white patches, minute scales in parts and curiously wrinkled elytra. Rostrum rather short, roughly punctured in front, towards the base two erect cylindrical tubercles, a groove marking it off from the head; antennæ short, stout; prothorax very convex, broad, rounded at the sides, on the disc a cross-shaped impression, and behind the transverse arm of the cross a double row of oblong raised points marked with a linear impression, and before it a band composed of whitish scales; scutellum distinct, white; elytra short and not much broader than the prothorax, covered with tubercles more or less marked, with narrow raised transverse and oblique lines, enclosing deep and irregular pits between them, the sides with strongly marked quadrate punctures, suture at the base and a transverse patch on the declivity composed of closely-set minute white scales.

Brachycerus obtusus. (Pl. II., fig. 3).

B. breviter ovatus, squamositate fusco-grisea tectus; rostrum breve, in medio unituberculatum, basi lobis duobus obliquis obsitum; prothorax lateraliter obtuse angulatus; elytra ovata, tuberculata, apice quasi truncata. Long. 6 lin.

Hab. Natal.

A short dark grey species, the elytra broadly rounded at the apex, but when viewed from above apparently truncate. Rostrum short, stout, the middle in front with a flattish tubercle and a raised line behind it, the base with two oblique lobes; prothorax transverse, closely punctured, the sides obtusely angulate, a deep depression at the apex, which is truncate; elytra ovate, the apex broadly rounded, each with three rows of stout conical tubercles, the sutural row confined to behind the middle, tubercles tipped with a short seta, the apical tubercle of the second row much

larger and bearing numerous longer setæ; body beneath shortly setose, legs with longer setæ; no spur on the posterior tibiæ.

Brachycerus draco. (Pl. II., fig. 4).

B. ovatus, nigro-fuscus, squamulis subaureis vestitus; rostrum elongatum, antice longitudinaliter excavatum; prothorax subtransversus, lateraliter fortiter angulatus, disco sparse punctatus; elytra ampliata, triseriatim tuberculata, tuberculis setis plurimis subaureis coronatis, interstitiis fortiter foveatis et sparse setosis; tarsis elongatis. Long. 9 lin.

Hab. Natal.

A dark brown species, but, as seen under a lens, clothed with minute rufous scales having a golden tint in certain lights. Rostrum long, with an elevated margin on each side contiguous at the base, marked off from the head by a slight groove, no superciliary ridge; prothorax subtransverse, angularly produced at the sides, the angle obliquely sloped anteriorly, the side anterior to the angle constricted, the apex truncate, with an oblong depression above, the disc with large shallow punctures; no ocular lobes: elytra broadly rounded at the sides, each with three rows of tubercles; tubercles of the inner and intermediate rows mostly depressed, the outer row and declivity composed of conical tubercles, all tipped with a fasciculus of long recumbent rufous golden-tinted setæ; body beneath and legs densely squamulose: tarsi elongate, especially the claw-joint.

Brachycerus turbatus. (Pl. II., fig. 5).

B. sat breviter ovatus, nigro-fuscus; rostrum breviusculum, dimidio apicali reticulato, basi lobis duobus munitum; prothorax transversus, lateraliter obtuse angulatus; elytra amplia, tuberculis granulisque minutis tecta. Long. 8 lin.

Hab. Natal.

A dull dark brown species, with a bluntly angular prothorax, and the elytra tuberculate, with the ordinary squamosity not very evident. Rostrum rather short, the apical half broad and unequally reticulate anteriorly, the base with two oblong tubercles; head marked off by a slight groove, no superciliary ridges; prothorax moderately transverse, bluntly angular at the sides, an oblong excavation at the apex, disc uneven, tubercles few, not conspicuous, some with a glossy black point; elytra broadly rounded at the sides, roughly and rather closely covered with many large tubercles, with smaller ones between, and scattered minute glossy black

granules over all; abdomen coarsely punctured; legs covered with pale grey scales and with numerous short setæ; tarsi moderately elongate.

Brachycerus gryphus. (Pl. II., fig. 6).

B. oblongo-ovatus, squamositate ferruginea tectus; rostrum modice elongatum, antice punctatum; prothorax transversus, lateraliter acute spinosus, antice excavatus; elytra amplia, biseriatim tuberculata, tuberculis apice setigeris, a basi ad declivitatem gradatim majoribus, serie exteriori tuberculis validis spina nigra acuta terminatis, interstitiis rude foveatis. Long. 10 lin.

Hab. Usambara.

An East African species; the sculpture approximates it to *B. draco*. Rostrum moderately long, the slightly raised margins coalescing towards the base, which is bilobed, and scarcely marked off from the head; prothorax slightly transverse, sides with a short acute conical spine, the apex with an oblong impression, disc with few tubercles, the largest above and a little behind the lateral spine; elytra broadly rounded at the sides, each with two rows of tubercles, those on the inner row consisting of five small and two much larger and more conical placed on the declivity, each tipped with a glossy black spot, the outer row consisting principally of three large conical tubercles, each terminating in a well-developed acute black spine, the intervals irregularly pitted, towards the outer margin several small glossy-black granules; tibiæ and tarsi ringed with black; claw-joint of the tarsi as long or longer than the rest together.

Brachycerus strumosus. (Pl. II., fig. 7).

B. ovatus, fuscus, squamis minutis pallidioribus tectus; rostrum elongatum, basin versus marginibus exterioribus elevatis; prothorax vix transversus, lateraliter angulatus, apice callositate magna munitus; elytra ampliata, biseriatim tuberculata, seriebus internis magnis planatis. Long. 10 lin.

Hab. Senegal.

A stout dull brown species covered with minute paler scales, and having a prominent callosity on the apex of the prothorax. Rostrum elongate, irregularly impressed in front, the posterior half with a raised margin on either side, and at the base two inconspicuous tubercles marking it off from the head; prothorax nearly as broad as long, angulate at the sides, the apex with a large rounded elevated callosity, and on each side above the angle a cluster of three or four unequal tubercles; elytra rather short,

broadly rounded at the sides, each with two rows of tubercles, the inner row with three, large and flat, having on the top a few setiferous punctures and a conical one on the declivity, the outer row composed of one round and three conical apiculate tubercles, rest of the elytra with numerous small unequal tubercles, many with a glossy black tip; legs rather long; claw-joint of the posterior tarsi as long as the rest together.

Brachycerus mœrens. (Pl. II., fig. 8).

B. ovatus, squamosus, fuscus, albo-notatus, supra nitide tuberculatus; rostrum breviusculum, parte apicali excepta, albido-squamosum, punctis dispersis, basi elevatum disjunctim bilobatum, a capite profunde separatum; prothorax paulo transversus, lateraliter acute spinosus; elytra subglobosa. Long. 6 lin.

Hab. Zambesi.

A dark brown species with patches of white scales, the upper parts dotted with unequal glossy black-tipped tubercles. Rostrum comparatively short, conspicuously punctured, except toward the apex, the intervals with pale yellowish scales, the base raised and bilobed, marked off from the head by a deep groove; prothorax, excluding the spines, about as long as broad, a deep oblong impression anteriorly, disc coarsely tuberculate, a few of the tubercles emarginate behind, a black seta issuing from the emargination, base of the lateral spine covered with white scales; a black scutellum; elytra subglobose, each with about six rows of tubercles, but the intervals so strongly and unequally pitted that at first they appear to be irregularly distributed, the tubercles on the inner row have a more granular character, the fourth and fifth rows are the most conspicuous, all the tubercles have a glossy black tip, and some have a seta as well, of the white patches the largest is basal, behind it are two smaller ones, at the side another, and the fifth is towards the apex; sides of the abdomen with four pale spots; legs covered with ashy scales.

Explanation of Plates I. & II.

PLATE I.

Fig. 1. *Brachycerus cinnamomeus.*
2. ,, *suturalis.*
3. ,, *eximius.*
4. ,, *disjunctus.*
5. ,, *capito.*
6. ,, *omissus.*
7. ,, *rixator.*
7*a*. ,, ,, rostrum.
8. ,, *Faustii.*
8*a*. ,, ,, rostrum.
9. ,, *præcursor.*
10. ,, *phlyetænoides.*

PLATE II.

1. *Brachycerus albicollis.*
2. ,, *clectilis.*
3. ,, *obtusus.*
4. ,, *draco.*
5. ,, *turbatus.*
6. ,, *gryphus.*
7. ,, *strumosus.*
8. ,, *mœrens.*

III. *Pedigree Moth-breeding, as a means of verifying certain important Constants in the General Theory of Heredity.* By Francis Galton, F.R.S.

[Read February 2nd, 1887.]

It was suggested by Mr. Merrifield, in answer to my inquiries, that moths, especially those which breed normally twice in the year, would be very suitable subjects for a course of such experimental breedings as I have long desired to establish. My object at the present time is to obtain *data* for the revision and extension of a general theory of simple heredity, on which I have lately published memoirs,* and especially to test that portion of it which relates to Stability of Type. In addition to this, the experiments I propose would elicit incidentally many interesting results, some perhaps quite disconnected with the objects immediately in view.

The merits of moths as subjects of experiment are that the arrangements for breeding them in large numbers occupy comparatively little space, and involve comparatively little cost; their generations succeed each other quickly, and they undergo no change in length or shape of wing, &c., during their brief lives, so that the difficulties elsewhere connected with age and growth disappear; the specimens that are used in the experiments can be afterwards mounted in cases, and be labelled and preserved for future reference.

Mr. Merrifield has very kindly offered to commence the experiments for me, and trusts to be able to continue them for some years. I lay the proposed plan before the Entomological Society in hope of eliciting the suggestions and help of its members before the course of experiments is fairly begun.

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* "Law of Regression," Journ. Anthrop. Inst., 1885; "Family Likeness in Stature," Proc. Royal Soc., 1886; "Family Likeness in Eye-Colour," Proc. Royal Soc., 1886.

The intention is to start from the brood of a single pair of moths (*Selenia illustraria* is suggested), and to trace the changes of some one characteristic,—say of the wing-length,—during many successive generations, down three parallel but contrasted lines of descent; the broods being reared all along out of doors, and under healthy and perfectly identical conditions. It will be convenient to distinguish these three lines of descent by the letters A, M, and Z. The A line of descent is to be produced by selecting and mating one (or more) pair of the longest-winged males and females that are found in the brood of the original pair. The progeny of this selected pair I will call A i. Out of the males and females in A i. one (or more) pair of the longest-winged will be selected. The progeny of this selected pair will be A ii. Out of the males and females in A ii. one (or more) pair of the longest-winged are again to be selected; their progeny will be A iii. This process will be continued for, it is hoped, at least six generations,—that is, for three years. Every moth in each of the broods is to be preserved, and those which become the parents of the succeeding brood are to be labelled accordingly. It is intended to mount the moths in an orderly series, separating the males from the females, and severally arranging them in the order of their wing-lengths, beginning with the longest and ending with the shortest.

The Z line of descent is to be produced by selecting and mating one (or more) of the shortest-winged males and females out of the original brood. Their progeny will be Z i. Out of these a selection of one (or more) pair of the shortest-winged males and females will be made, whose progeny will be Z. ii., and so on as before. Moths which are small, owing to deformity or obvious unhealthiness, should not be selected for breeding from.

The M line of descent is to be produced by selecting and mating one (or more) pair of medium-winged individuals out of the original brood; their progeny will be M i. Out of these a selection of one (or more) pair of the medium-winged males and females will be made, whose progeny will be M. ii., and so on as before. It will be understood that by medium-winged I mean with reference to the brood in question, and not with reference to the original brood. The use of the M line is to

afford a standard whence the divergencies of the A and Z lines in each generation can most suitably be measured. M will be affected, together with A and Z, by all the influences that affect the entire stock, and will therefore exhibit in an unmixed degree the A and Z *peculiarities*. It will easily be understood how important it is to attend to the requirement already laid down that the three lines of descent should be carried on under *identical conditions*.

The broods in the M and Z lines will be mounted in the same way as those in the A line. Therefore for every generation there will be three compartments in one or more trays, each containing (say roughly) 100 moths, and, as there are two generations in a year, the result of each year's breeding will be to fill six compartments.

After the sixth generation or thereabouts has been reached in each of the three lines of descent, it is further desired to proceed conversely, by breeding from medium specimens in each of the three lines, and again from medium specimens of their several broods, and so on until all trace of the A and Z peculiarities shall have disappeared from their respective descendants.

I have spoken of one *or more* pairs, because the moths do not emerge simultaneously, and yet they must be paired soon after they emerge. The ideal pair in the A line would be the very longest-winged male and the very longest-winged female of the entire brood, and in the Z line the very shortest-winged. In practice we must be content with an approximation to this. Two or three separate matings will have to be made between the most suitable of the brood at the time when they require to be paired, but the eggs that are to be preserved and reared will be those of only one or two of the most suitable of the trial pairs. The produce of different pairs ought not to be mixed.

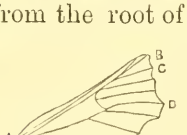
There will be little difficulty about the M pairings, as mediocrities are numerous.

The wing-length is the characteristic with which it is at present proposed to deal, as being more definite and easily measured than others. A similar treatment might be adopted in respect to other characteristics, such as the area of the wing, or the area of the patch of colour in the wings of such moths as may possess it.

A would in this case symbolise large areas, and Z small ones. Or the subject of experiment might be the depth of the general tint. Or, again, it might be the greater or less acuteness of the angle of the wing. Any variable characteristic that exists in both sexes and in all individuals can be treated in this way.

As there is no difficulty in treating the two sexes on equal terms in statistical inquiries by first transmuting all female measurements to their male equivalents [in human stature this is effected by adding one-twelfth or thereabouts; I use the multiplies of 1·08], so probably the different broods of dimorphous moths may be rendered comparable in the same way, and it may be found unnecessary in *Selenia illustraria* to confine the comparisons between spring-brood and spring-broods, and between autumn-brood and autumn-broods respectively. Thus the advantage of double-broodness, in giving two steps a year instead of one, will probably not be lost by experimenting on a dimorphous species.

Measurement.—The wing-length is to be measured from the root of the wing to its tip (that is, from A to B in the fig.). A has to be estimated from the run of the upper and lower margins, and can be determined with fair precision. B is very well-defined in a normal wing. Should, however, the tip be injured, the measurement is to be made from A to C, and stated accordingly. Again, if both B and C are injured, measure from A to D, and state so.



In performing the measurement with a pair of compasses (or other scale) it is necessary to bring the points very close to the moth, else a slight change in the position of the eye will give discordant readings; and if the eye is not moved at all the readings will be sensibly too small. A magnifying-glass is desirable. For measuring living but sluggish moths, I have contrived a pair of compasses that work well and quickly when making the ordinary measurements, and which carry a magnifying-glass. I will not, however, now give a drawing of it, because I want to assure myself of the handiest form of the instrument before doing so. Its principle is this. Imagine a pair of fine-pointed scissors with very long arms,—say five times as long as the blades; the points of the blades represent the compass-points. At the end

of one of the arms a scale is pivotted; its free end runs over a pin at the end of the other arm. As the distance between the pivot and the pin is always five times that between the compass-points, the scale is five times the natural size, and can be read off easily to half millimetres, the pin acting as index. In using these compasses the forefinger slightly presses the scale against both the arm on which its free end rests and the pin over which it runs. When the compass is satisfactorily adjusted an increased pressure is sufficient to clamp the scale, and it can then be read off. I have also tried the glasses from one of the tubes of an opera-glass, with a lengthened interval between them, so as to form a microscope of very long focus, say 18 in. This was fixed on a light rod that carried a millimetre scale, set across its free end at a trifle less than 18 in. from the object-glass. On approaching the scale to within half an inch of any small object, that object and the scale are both in fair focus at once, and they are sufficiently far from the eye to render the error of which I spoke of little or no importance.

For the accurate measurement of dead moths I have a much better instrument under construction, in which I use a small microscope with cross wires in the short limb of a pentagraph, and use the long limb both for setting the microscope and for reading off the measurements.

The details of the whole procedure are settled thus far only provisionally, as it is reasonable to hope that much has yet to be gained from the past experience of others, and more by the earlier stages of the experiments themselves, so far as they are new to experience. I have considerable hopes that many persons may feel disposed to work with me, for I am sure it will be accepted as an obvious truth by all, whether they may interest themselves in the technical explanations that follow these remarks or not, that sets of broods of pedigree moths, all of whose direct ancestors, male and female, and all of whose uncles and aunts, great uncles and great aunts, and so on for at least six generations, are preserved in convenient trays for reiterated study, would form a collection of first-class importance for hereditary investigation.

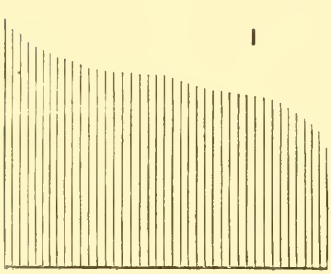
It would be well if in each case of experiment more

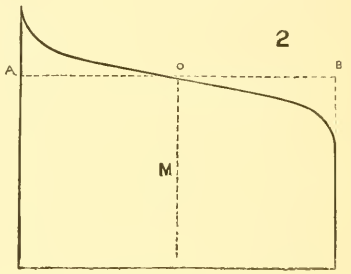
than one stock could be reared, descended from the same original pair of moths, but in different places, in order that the male and female pupæ may be occasionally interchanged and the moths cross bred, by which the evils of too close interbreeding would be diminished. I sincerely hope that any practical entomologist who may be disposed to further these experiments will communicate with me at 42, Rutland Gate, London, S.W., or with Mr. Merrifield.

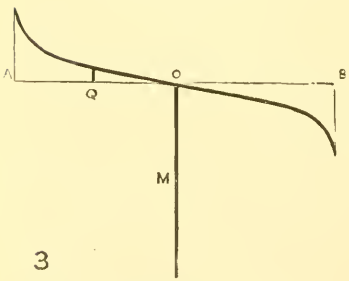
APPENDIX.

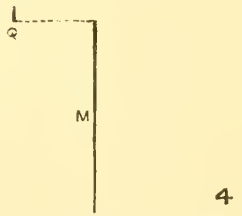
ON THE PROPOSED METHOD OF DEALING WITH THE OBSERVATIONS.

After the results of the experiments have been obtained they will be treated by me in somewhat the same minute and technical way that the data I now possess were treated in the memoirs









already referred to. It may perhaps be well to give here a brief and partial account of the guiding principles.

When we represent the wing-length of every specimen in a large brood by a corresponding vertical line, and arrange these lines in an orderly manner according to their lengths, and at equal distances apart upon an horizontal base, we shall obtain a figure like that shown in fig. 1. Here, however, only some twenty vertical lines have been drawn, sufficient to indicate what is meant. It is not necessary to make a larger or more minute drawing for the sake of mere explanation. The variability of wing-length, as indicated by the difference between the lengths of the longer and shorter lines, has been purposely exaggerated to make the meaning of the figures more clear.

In fig. 2 these upright lines had been enclosed within a dotted boundary whose vertical sides should lie at an interval of one-half space before the first and beyond the last of the lines respectively, and whose upper portion is a smooth curve drawn with a free hand, touching the tops of the vertical lines; then the vertical lines are supposed to have been rubbed out, and only the contour or "scheme" to remain. This scheme contains, in a most compact form, the measurement of every individual in a brood, or in a population however large. A dotted vertical line, or ordinate, M, is drawn to the curve from a point that bisects the base, and a horizontal line is drawn through the point O in the curve where this ordinate, which is the "median" of the curve, meets it. The median is practically the same as the average, and it is clear from the construction that its value is quite independent both of the width of the scheme and of the number of individuals to which the scheme refers, so long as they are fairly numerous. The horizontal line A O B is the "axis" of the curve; it divides it into symmetrical halves. In fig. 3 the nearer half of the axis A O is itself bisected, and an ordinate Q is drawn to the curve from the point of bisection. Q is what I call the "Quartile" of the curve.

In fig. 4, M and Q are all that remain, and they are all that we are mathematically concerned with. When they and the interval between them are given the whole of the scheme can be calculated; but the interval between them is unimportant for the objects in view. It does not in the least matter on what horizontal scale the scheme is drawn, as the values of Q M and other ordinates at different *fractional* divisions of the axis are independent of the horizontal extension. Q and M are the only values in which we are interested, and it is with these that I work.

It has been abundantly shown by many, from Quetelet onwards, and all my own many statistical inquiries confirm the view, that

the curve in the above figure* is, or at least tends to be, of as definite a character as an ellipse or any other familiar curve; that it equally admits of mathematical definition, and that it possesses peculiar properties of its own that are of the highest importance to statistical inquirers. Just as an infinite variety of ellipses may be drawn on the axis A B, differing from one another in their extension above and below A B, but otherwise preserving the well-known proportion of an ellipse; so may an infinite variety of *curves of normal variability* be drawn on the axis A B, differing from one another only in the amount of their extension above or below it, as measured conveniently by the length of Q. They will all maintain the proportions shown in the table below, which refers to the middle nine-tenths of the curve. The twentieth part at either end is sure to become irregular. O A is supposed in the Table to be divided into 50 parts, the division at O counting as 0°, and that at A at 50°; then, when Q is taken equal to 100 units, the several ordinates drawn from the principal divisions on the axis are of the lengths shown in the table. For any other value of Q all the tabular values must be changed in uniform proportion to the new value of Q.

	Division.	Length of Ordinate.
	0	0
	10	38
	20	78
Q	25	100
	30	125
	40	190
	45	244
	50	indefinite

As the curve is symmetrical the same measurements apply to either half of it, but in the one half they are made from the axis upwards, in the other half they are made downwards.

If the curve derived from a series of measurements of any variable characteristic is found on trial to conform fairly well with these proportions, it may be assumed that the characteristics in question vary "normally," that is to say, according to the recognised laws of chance, which specify the relative frequency of runs of luck of different lengths. Again, in so far as they vary normally, all the properties of the laws of normal variation may justly be assigned to them. It was by the use of these laws that my deductions were made.

* The curve actually used by these writers is of another kind and has another signification, but for all that it is the basis of the curve that I employ.

I have exhibited to this Society, as an example of the law of variability, a row of about 100 pods of sweet peas, the produce or brood of a single plant, which I had arranged edgeways, like the vertical lines in fig. 1. Their outline expresses very distinctly the peculiar shape of the curve of variability.

The object of preserving the entire brood of moths is to obtain careful after-measurements from which to deduce the values of M and of Q in each case. When this is done we shall be able to deal with each group in its entirety, and to submit it to mathematical treatment.

The data I have hitherto used in my inquiries were rarely derived from more than three generations, but the condition of statistical constancy in the peculiarities of a population, of which I will again speak, enabled me to extend their scope. They sufficed in this way to lead to many interesting, though perhaps only approximative, results. One is that each parent contributes, on the average, one quarter of the total hereditary peculiarities of the child, each grandparent one-sixteenth, and so on. In other words, that the two parents together contribute one-half, the four grandparents a quarter, the eight great-grandparents one-eighth, and so on, the whole heritage being thus accounted for. But when none of the progenitors besides the two parents are known, their implied peculiarities must be taken into account. They admit of being calculated, and have to be allowed for in the form of an increase to the hereditary contributions of the parents. It is found that each parent should in that case be held to contribute one-third; the difference between one-third and one-quarter (or one-twelfth) being the amount of the implied heritages. It is, however, highly probable from other considerations that, though this simple formula may be closely true for the parents, and nearly true for the grandparents, it may become sensibly and increasingly different for remoter progenitors. It is this that I want to investigate, chiefly through inquiries into Regression. Moreover, all theory concerning the cause and character of Stability of Type, and of much else of high interest in any general view of Heredity, must be based upon the facts of Regression, which such experiments as those proposed can alone, so far as I see, be likely to declare in a trustworthy way.

The laws of simple heredity, as I made them out, involve only five constants. These admit of being separately determined, and they are at the same time connected by an equation that serves to verify their observed values. The equation depends on the fact alluded to, that successive generations of the same population yield identical biological statistics, although each family, or brood,

is full of variations, and although the "median" of each characteristic in each brood is on the average *always more mediocre* than the corresponding characteristic in the mean of the two parents. The first of these events, "fraternal variability," increases the variability of the population as a whole, and the latter event, which I call "Regression," decreases it; the two can be shown to counterbalance each other, and give rise to a position of stable equilibrium. The five constants are (1), the Median of the race; (2), the Quartile of the race; (3), the Quartile of the broods of the same parents, *i.e.*, brothers or sisters; (4), the Quartile of broods of a large number of *like* parents, mixed together in a single group; (5), the coefficient of Regression. The laws in which these constants play a part give calculated results that prove to be closely true to observation in the ordinary cases of simple heredity, where there has been no long-continued selection, but it does not at all follow that they will hold true for the descendants of a long succession of widely divergent parents. It is this that I want to test. The point towards which Regression tends cannot, as the history of Evolution shows, be really fixed. Then the vexed question arises whether it varies slowly or by abrupt changes, coincident with changes of organic equilibrium which may be transmitted hereditarily; in other words, with small or large changes of type. Moreover, the values of the Quartile in (3) and (4) cannot be strictly constant, and are probably connected in part with the value of the median, and require a modified treatment by using the geometrical law of error instead of the arithmetical one (Proc. Royal Soc., 1879). Again, the diminution both of fertility and of vitality that accompany wide divergence from racial mediocrity have yet to be measured, by comparing the A and Z broods with the M broods. It was assumed not to vary in the approximative theory of which I spoke.

IV. *Practical suggestions and enquiries as to the method of breeding* Selenia illustraria *for the purpose of obtaining data for Mr. Galton.* By Frederic Merrifield.

[Read February 2nd, 1887.]

It being necessary for the purpose of these experiments to bring up in a healthy state nearly all the individuals in every successive brood, instead of merely to obtain a fair number of cabinet specimens,—the usual object of larva-breeders,—more than usual care will be necessary to avoid dwarfing and casualties. No apology, therefore, is offered for submitting the following detailed suggestions,—the result of answers kindly given to many enquiries,—while at the same time further information is invited.

Selection of Species.—The species chosen should be variable in size and easy to rear, pair, and measure; and regularly double-brooded species have the great advantage of reducing by one-half the period required for bringing the experiments to an end. After fully weighing objections, the writer has determined to try a species of which he has considerable knowledge, *Selenia illustraria* (the Purple Thorn), adding to his preliminary experience by practising on the common *S. illunaria*, which appears a month earlier. Other double-brooded species are recommended, viz., the *Ephyras* (especially *E. pendularia*), *Drepana falcula*, and the *Closteras;* among single-brooded moths some of the common and easily bred Bombyces, especially *Hypogymna dispar*, and that variable, interesting, and easily reared Geometer, *Angerona prunaria*. Those who can get over the difficulty of pairing which the butterflies generally present would probably find the common and easily fed and double-brooded *Pieris brassicæ* very suitable.

It is much to be desired that the same species should be taken up by more than one observer, as in this way the accidental failure of a brood may be guarded against,

and provision may be made for occasional cross-breeding to promote the vigour of the breed. Observers living in countries where there is a large choice of double-brooded insects, especially where the climate is such as to admit of three or four broods a year, have great advantages. Under such conditions probably some of the silk-producing Bombyces would be favourable subjects.

Apart from the bearing of the experiments on the theory of heredity to be elucidated, they can hardly fail to throw light on many problems in evolution, such as those which have been investigated by Prof. Weismann, as well as to furnish facts of interest in the life-history of the insects chosen for experiment;—such as the proportion of males and females, and the order in which they appear; the time of the day or night when they emerge from pupa; the time when they are most active on the wing, or in feeding as larvæ; the number of eggs laid; the duration of life in the several stages; the influence of temperature, moisture, and food-plant, &c.; —facts many of which have a general interest for entomologists, but which are rarely recorded with completeness and accuracy by those who only breed for cabinet purposes.

Attention is called to the importance, whatever species is chosen, of starting with a healthy original stock. Pupæ freshly dug or obtained from larvæ found wild, or eggs from moths caught wild, are preferable, as there need be no apprehension that they are suffering under defects engendered by feeding under artificial conditions or by interbreeding. In any case the origin or history of the stock with which the experiments are begun should be known. A supply from a foreign country does not appear to be objectionable, if the species obtained there is known to have the ordinary appearance, size, and habits of the native specimens.

The writer will be greatly obliged to any entomologist, having had practical experience in the rearing of larvæ, for any suggestions tending to ensure success in the experiments determined on. He would be particularly obliged by answers to the following enquiries:—How long can such moths as the *Selenias*, spring and summer broods respectively, be kept alive and quiet, and how can this best be done? Can any better plan be suggested than that of subjecting them to cold and darkness, and

what lowness of temperature will they bear without injury? Are the *Selenias* ever found feeding on flowers, or are they known to feed in confinement? Are the pupæ killed or injured by severe frosts? — Please address replies to 24, Vernon Terrace, Brighton.

APPENDIX.

General Treatment.—For the success of these experiments it seems very important to observe the principle that the insect should, all through its life, be subjected, as far as possible, to the natural conditions in which it exists, while protected from its natural enemies and from casualties. For example, *S. illustraria*, in a state of nature, lives in a much cooler, moister, and fresher air than it does when bred in-doors; its food-plant is exposed to similar influences, to a much stronger light, and its leaves are never in a flagging condition. On the other hand, the wild insect is subject to the depredations of birds, mice, earwigs, beetles, ants, ichneumon flies, and other predaceous and parasitic insects; and is exposed to injury by storms. These considerations point to the following precautions.

Larvæ.—Feed the larvæ, when practicable, on growing trees out of doors, confining them by "sleeves" of the material that most readily admits light and air, but is close enough to keep in the larvæ and exclude insect enemies; muslin, leno, and calico have been recommended for the purpose. This mode of out-door feeding saves some trouble, but does not dispense with frequent supervision, especially in rough weather. The sleeves should be frequently examined; snails and slugs will sometimes eat holes in them. Shelter may be necessary in stormy weather; for this reason, dwarf trees and trees in pots are advantageous. In town gardens a fencing of wire-netting is often necessary as a protection against larger animals. The sleeve should be opened frequently to remove the "frass" and shift the larvæ to fresh quarters, and folds in which the larvæ may get entangled should be avoided. When they are nearly full grown it may be expedient to remove them to a breeding-cage. The larvæ of *S. illustraria* seem to move about in the latter part of the afternoon, but not in general to feed till night. They should not be crowded.

Until the larvæ are so large that they cannot crawl through the interstices of the sleeve they may either be fed on a potted tree in-doors, or, perhaps more safely, in a glass-cylinder, such as is described in books on larva-breeding (Rev. J. Green's 'Insect Hunter's Companion,' Dr. Knaggs' articles in the early volumes of the 'Entomologist's Monthly Magazine,' &c.), or in a jar. A simple

and handy one is a jam-pot, with the edge ground down smooth and covered with a piece of very fine muslin, held in place by an elastic-band, and having a piece of plate-glass laid over the top, and occasionally shifted aside for ventilation, and to prevent the formation of drops of water in which the larvæ may drown. Though the pupæ is described as subterranean, it generally spins up between leaves.

If growing trees are not available, the larvæ should be reared in a breeding-cage, standing in a cool airy place out of doors, well supplied with food standing in water-bottles, the necks tightly stuffed with moss, &c. The cage should have a thorough draught, and for the sake of the healthiness of the food-plant it is recommended that the top at least should be of glass. There may be an inch of fine light earth covered with a layer of moss, often renewed. All moss and earth should be baked to kill enemies. *S. illustraria* will eat birch, oak, ash, hawthorn, sallow, and alder, but the young larvæ sometimes will not take to all of these, therefore it may be expedient to try them with more than one, and when they are found to thrive on it they should be kept to it. It is stated to be best to cut their food from the same tree and the same side of it. *With the precautions suggested*, and a very frequent renewal of the food-plant, it is believed that the larvæ may be brought up in out-door breeding-cages almost as successfully as by "sleeving" them on growing trees. An occasional moistening of the food with soft water from a scent-spray is useful, especially if the breeding-cage is in an airy situation and the air is dry; but in this case particular care should be taken to remove the layer of moss with the frass and dead leaves collected on it, and at the first symptom of mould or mildew the process should be stopped. All the broods (long-, medium-, and short-winged) should be given the same food-plant and treated in the same way.

Pupæ.—As to the pupæ, it is believed the best way is to keep them out of doors, sheltered from rain, and laid in their slight cocoons on earth covered with moss, and prevented from drying up by placing the box containing them in a situation which will cause the earth to be slightly moist at bottom, or, if this cannot be arranged, by occasional watering with soft water from a scent-spray. Though these pupæ are generally found naturally in dry situations, they are there continually exposed to more or less moist air, and are in the winter rarely removed more than an inch or two from moist earth; and it has been found that if the leaves in which they are spun up become quite dry, the moth has a difficulty in coming out. The pupæ should be occasionally looked at, and a watch kept for insect enemies, including the larvæ of the Tineæ. It would be prudent to protect them against severe frost.

Moths.—Double-brooded moths are very apt to be influenced as to the time of their appearance by temperature. In an unusually warm season if kept out of doors, and in an ordinary season if kept in-doors, some of the moths will sometimes come out, or the caterpillars will spin up too soon, and the moths from them may come out as a third brood. Conversely, if the temperature be very low some of the larvæ of the spring brood will feed up very slowly, and some of the pupæ go over to another year, instead of coming out as a second brood. Any risk of this kind can generally be obviated by moderate watchfulness, and by moving the insects to a cooler or warmer situation, in or out of doors, as may be best. In the South of England *S. illustraria* should appear from the middle or latter part of April through May, and the second brood (its pupa-stage lasting only two or three weeks) in August; any material departure from these dates that may actually appear, or be threatened by the rapid or slow progress of the larvæ, should be counteracted by shifting to cooler or warmer quarters.

Two pairs of each of the sizes (largest-, medium-, and smallest-winged), will probably be enough to produce the required number of eggs, and allow for casualties. After these pairs have been selected and have mated, the rest of the brood should be killed, set, and arranged in a drawer or store-box, according to size, the males and females separately; the breeding pairs, when they have laid their eggs, being set and put in their proper places with the rest, but labelled. Each successive brood will of course be kept separate from all the others. To ensure mating, the pair should be placed in a round bag of muslin, &c., over a fresh spray of the food-plant. A rather warm and moist air seems most conducive to activity in the winged state.

To keep moths long in a living state they should be in a moist air, and have access to honey diluted with water, best supplied by soaking little pieces of sponge in it. A single female of *S. illustraria* may lay 100 eggs or upwards. The female is apt to scatter her eggs over the bag if left in it; if transferred to a jam-pot and supplied with crumpled paper, she will *probably* lay in the creases, which can then be cut out and attached to the food-plant as the hatching period approaches. As it is necessary to preserve all, or nearly all, of a brood of 50 or 100 moths in an unpaired but healthy and vigorous condition till the whole brood is out,—a period which, under ordinary circumstances, may last several weeks, especially with the spring brood,—provision should be made beforehand for this purpose. The males and females should be separated in the pupa-stage (in all the species named they can easily be discriminated by the different appearance of the antennæ, aided by the different

size of the abdomen). As soon as the first moth emerges the remaining pupæ should—without being exposed to a high temperature or to sunshine—be placed in a warm room, and the moths, as they emerge, be placed in a cool moist place, and there be kept in absolute darkness. A refrigerator, or a zinc cover constructed on the evaporating butter-cooler principle, may possibly have to be used here. For convenience in removing the moths without exciting them or injuring their claws, it seems best to place each pupa in a separate chip-box, having a black net lid. This is the course which the writer intends to follow. The moths can be roughly sorted by the eye, but for the sake of greater accuracy a pair of compasses should be used. (*See* the remarks on these in Mr. Galton's paper.) If the species to be measured is small or lively, it may be necessary to temporarily stupify it by placing it under a glass with a few drops of chloroform on blotting-paper.

V. *Description of a new species of* Synchloë *from Kilimanjaro.* By Philip Crowley, F.L.S., F.Z.S., &c.

[Read February 2nd, 1887.]

Plate III.

Among some butterflies Mr. Watkins submitted to me the other day, received by him from Mr. J. M. Johnston, and collected by his brother Mr. H. H. Johnston during his visit to Kilimanjaro, I found a new species, which I propose to describe under the name of *Synchloë Johnstonii*. It is very nearly allied to *Synchloë hellica*, but differs from it in both sexes in having the wings more pointed at the apex, and in the costal margin of the fore wings being longer; the black on the apical area covers rather a larger space, and the four white spots in it are more definite. The marginal black spots in the hind wings of the male are larger than in *S. hellica*, and the spot near the inner margin of the fore wings in the female is only represented by a few blackish scales. The male type is in my own collection; the female in that of the Natural History Museum, which also contains a male. Expanse of wing, 1·9 to 2·0.

In the accompanying plate (No. III.) are represented the male, female, and under side of *Synchloë Johnstonii*, and also the upper and under side of the male of *S. hellica* for comparison.

Explanation of Plate III.

Fig. 1. *Synchloë Johnstonii*, male.
2. ,, ,, female.
3. ,, ,, under side of male.
4. ,, *hellica*, male.
5. ,, ,, under side of male.

VI. *Descriptions of some new species of* Rhopalocera *from the Solomon Islands.* By Gervase F. Mathew, Staff Paymaster, Royal Navy, F.L.S., F.Z.S., &c.

[Read March 2nd, 1886.]

Plate IV.

The following are descriptions of new species of Rhopalocera taken in the Solomon Islands during the short visits of H.M.S. 'Espiègle' in 1882-3:—

NYMPHALIDÆ.

DANAINÆ.

Euplœa nechos, n. s.

♂. *Upper side* unspotted, deep velvety sepia-brown, slightly paler towards margins, especially near anal angles; a very large scent-brand on fore wings between submedian nervure and first median nervule, oblong-oval, and occupying two-thirds of the interspace. *Under side* warm sepia-brown, apex, anal angles of fore wings, and costa and inner margins of hind wings paler. *Fore wings*:—A conspicuous pale blue spot in cell near the end; a transverse series of four linear-shaped pale blue spots just beyond the cell, the upper one between submedian nervure and upper discoidal nervule; the spot between the discoidal nervules almost obsolete; a conspicuous elongated white spot between first and second median nervules; scent-gland pitchy-brown, and dotted with minute white atoms, its outer margin white. *Hind wings*:—At base a bluish-white spot on precostal and costal nervures, one between median and submedian nervure, and one between internal nervure and abdominal margin; a conspicuous pale blue spot in cell near the end, and a curved series of five pale blue spots just beyond the cell, between upper subcostal and lower median nervule. A minute white spot at base of each antenna, one on each side of collar, and one on each scapula. Abdomen spotted with white at sides and beneath. Exp. 94 mm.

Hab. Treasury Island, Solomon Islands.

Obs. This species is remarkable for the large size of

the sexual brand, and does not appear to be near any yet described, though perhaps it is somewhat allied to *E. fraudulenta*, Butl.

SATYRINÆ.

Mycalesis sara, n. s. (Pl. IV., fig. 3).

♂. *Upper side* rich tawny. *Fore wings*:—A broad blackish-brown marginal border from two-thirds of costa curving slightly to anal angle; an ocellated submarginal spot, black with minute white centre, and dark tawny margins, situated between first and second median nervules; a minute white spot near the apex. *Hind wings*:—A broad marginal black band gradually becoming narrower towards anal angle; a submarginal series of three ocellated spots, similar to the one on fore wings, but the upper one very minute, and its white pupil barely perceptible, the central spot much the largest, and situated between submedian nervure and first median nervule. *Under side* dark brownish ochreous, a narrow and slightly waved chestnut-red fascia from costa just beyond end of cell nearly to anal angle of hind wings, outwardly bordered by a narrow bluish-purple stripe having opalescent reflections; a submarginal series of eight ocellated spots, black with white centres, and orange-yellow margins bordered by black, two on fore wings, six on hind wings; two slightly waved submarginal lines. *Hind wings*:—Second spot very minute, third rather larger, neither with pupils, first and fifth the largest. Exp. 60 mm.

Hab. Ugi, Solomon Islands.

Obs. Allied to *M. messene*, Hew., but much larger and very different beneath.

Mycalesis splendens, n. s. (Pl. IV., fig. 4).

♀. Wings broad and ample. *Upper side* deep olive-brown, inclining to golden-brown in certain lights; outer margin with a paler band, in which are two narrow and rather indistinct submarginal lines of a darker hue. *Fore wings*:—Two conspicuous submarginal ocellated spots, black with white centres, and broad orange-yellow margins, the upper about half the size of the lower, and situated above upper discoidal nervule, the lower one placed between second and third median nervules. *Hind wings*:—A submarginal series of four ocellated spots similar to those on the fore wings, of which the first and second are the smallest, and the third the largest; these are all placed between the nervules, the first

between discoidal nervules, and the fourth between submedian nervure, and third median nervule. *Under side*:—Base of wings pale ochreous, both crossed beyond the middle by a very broad fascia, dusky in the centre, and metallic-purple at the margins, which contains the ocellated spots, two on fore wings, six on hind wings, and is bordered internally on both wings by another rather broad, deep chestnut-red, fascia, its inner margin somewhat irregular, and just entering apex of cell; outwardly there is another rather narrow pale purple submarginal fascia, broader towards the costa, and bordered on each side by narrow reddish-purple lines, the inner one rather waved, and beyond this a narrow marginal ochreous fascia outwardly bordered by a reddish-purple line. *Fore wings*:—Ocellated spots same as on upper surface, but larger and brighter, and with their outer margins pale yellow. *Hind wings*:—A narrow and somewhat waved chestnut-coloured fascia from a third of costa crosses cell and terminates just beyond submedian nervure; ocellated spots, second and third the smallest, fourth and sixth about the same size, first larger than fourth and sixth, and fifth the largest. Exp. 62 mm.

Hab. Treasury Island, Solomon Islands.

Obs. This is a very beautiful and distinct species.

NYMPHALINÆ.

Messaras melichrysos, n. s.

♂. *Upper side*:—Basal half of wings deep fulvous-brown. *Fore wings*:—A broad transverse golden-yellow fascia crosses wings from end of cell, its margins deep orange, and the outer strongly convex; costa narrowly, apex and outer margin broadly, deep velvety blackish brown, with an indistinct round black spot between each of the median nervules. *Hind wings*:—Fascia much narrower than on fore wings, and extending from costa beyond middle to just beyond third median nervule, where it dies away; outer margin broadly deep velvety blackish-brown, inwardly bordered by a band of large black square-shaped spots with their inner and lateral margins orange-brown, between which and the fascia there is a band composed of a series of indistinct lunules bordered on each side by dusky; between macular band and outer margin an indistinct line of a paler hue. *Under side*:—Basal area pale ochreous, a fascia of a paler hue crosses wings from costa to near anal angle, broad in fore wings, much narrower in hind wings. *Fore wings*:—Apex and broad marginal band brownish-purple, with a series of six blackish spots between the nervules, those between

submedian and first median and first and second median much the largest, while those towards the apex are more or less indistinct; some of these spots are outwardly edged with yellowish; a submarginal line of reddish-brown bordered inwardly by a band of lunular-shaped pearly-grey spots between the nervules, those towards the apex being rather indistinct; in apical region a few shining purple atoms. *Hind wings*:—A submarginal band of suboval black spots in orange rings, and bordered inwardly by a line of crescent-shaped pearly-purplish lunules, which are inwardly and narrowly margined with reddish-brown; a submarginal series of linear-shaped yellowish lunules bordered on each side by reddish-brown; outer margin pale reddish-ochreous. Exp. 60 mm.

Hab. Ugi, Solomon Islands.

Obs. Allied to *M. Lampetia*, L., but differs in the breadth of the fascia on the fore wings, which is constricted towards and does not touch the costa. It is also a larger insect.

Messarus tredecia, n. s. (Pl. IV., fig. 2).

♂. *Upper side*:—Basal half of wings fulvous-brown; a broad transverse band from just beyond middle of costa to near anal angle of hind wings. *Fore wings*:—The outer edge of band somewhat convex, its upper portion pale creamy-ochre, and barely extending beyond the subcostal nervure, the lower part and margins more or less suffused with orange; the whole of the apical region and outer margin broadly deep smoky-brown, with a submarginal band of six large but rather indistinct black spots between the nervules; two submarginal waved black lines, between which are some indistinct lunules of a paler hue. *Hind wings*:—Band orange, except between costal nervure and costa, where it is pearly-white; a narrow interrupted darker streak on its outer margin; outer margin broadly smoky-brown, with a submarginal band of seven black spots more or less encircled with orange, the upper two and seventh rather small, the remaining four large and almost square-shaped; between submarginal spots and outer margin a paler lunular band bordered on each side by black. *Under side*:—Basal half of wings ochraceous; band pale straw-yellow, and on hind wings not as broad as on upper surface. *Fore wings*:—Apex and outer marginal band broadly reddish-brown, somewhat inclining to orange; a submarginal row of almost round black spots, the one between submedian nervure and first median nervule much the largest, those towards apex rather

indistinct; a narrow marginal reddish-brown line bordered inwardly by a series of pearly-grey lunules between the nervules, those towards apex small and indistinct; the apical spots are bordered inwardly by some indistinct lunules composed of shining purplish atoms. *Hind wings*:—A broad reddish-brown marginal band containing a series of seven large black spots with orange margins, situated between the nervules, and bordered inwardly by a narrow shining purple sinuous band; a narrow submarginal band of reddish-brown inwardly bordered by lunules of pearly-grey; outer margin rather paler. Exp. 72 mm.

Hab. Treasury Island, Solomon Islands.

Obs. Allied to the above, but much larger. The transverse band on the fore wings is much broader and paler, and on the hind wings crosses nearly to anal angle, and the spots above and below are much larger.

Rhinopalpa paronia n. s. (Pl. IV., fig. 1).

♀. *Upper side* rich sepia-brown, with golden reflections; a broad transverse fascia crosses both wings from just beyond cell on costa to anal angle of hind wings. *Fore wings*:—Fascia slightly curved, pale creamy-yellow, almost white in some places, costal edge, margins, and lower part inclining to dark orange; two narrow, black, indistinct, and slightly waved submarginal lines, between which the ground colour is somewhat paler; a submarginal series of indistinct round black spots between the nervules, those between lower discoidal nervule and second median nervule having minute purple pupils. *Hind wings*:—Costal portion of fascia almost white, remainder rich creamy-yellow; a submarginal series of seven large ocellated spots, black with small purple centres and orange margins, situated in a band of dark brown; spots at apex small and very indistinct, and at anal angle somewhat blurred and without a pupil; two narrow waved blackish submarginal bands, between which and the band enclosing the ocellated spots is a series of clouded orange lunules. *Under side*:—Basal area of wings pale reddish-ochreous; fascia not as broad as on upper surface, pale creamy-white, and inwardly bordered by a narrow dark reddish-brown and slightly waved line. *Fore wings*:—Cell with two irregular transverse pale bands edged with dark reddish-brown; apex and outer margins pale sepia-brown; a submarginal series of six ocellated spots, black with indistinct purple pupils, and somewhat clouded orange margins, the apical spot the smallest, and the spot at anal angle without a pupil; two narrow

submarginal bands, the outer nearly straight, the inner waved, and between them some paler lunules. *Hind wings*:—A narrow dark reddish-brown line from costa crossing cell to submedian nervure; beyond fascia a broad submarginal band of pale sepia-brown containing a series of seven ocellated spots, black with purple centres and orange margins, the upper one very small and indistinct and without pupil, the middle with largest pupil; outer margin paler, with two submarginal stripes, the outer one narrow, distinct, and somewhat waved, the inner one much broader and well-defined on outer edge, the space between the two greyish; between inner band and ocellated spots some indistinct greyish-yellow lunules; a blackish blotch at anal angle. Exp. 73 mm.

Hab. Treasury Island, Solomon Islands.

Obs. Allied to *R. algina*, Boisd., but ocellated spots on hind wings very much larger and brighter, and fascia on fore wings concave; under side very different.

Cyrestis Solomonis, n. s.

♂. *Upper side* warm brownish ochreous; outer margins dark brown; a broad creamy-white, or white, fascia from two-thirds of costa crosses wings, becomes narrower upon reaching the hind wings, and terminates almost in a point at submedian nervure; the following markings between inner margin of fascia and base of wings: first, a narrow oblique stripe from subcostal nervure at base of cell to submedian nervure of hind wings; second, a short and slightly elbowed pale stripe bordered outwardly by dark brown across cell only; third, a narrow oblique pale stripe across cell, continued to submedian nervure of hind wing and inwardly bordered in cell by dark brown, beyond outwardly bordered by a band of dark brown; fifth, a slightly curved and rather dark stripe; and sixth, a paler and rather thicker stripe just beyond the cell, the fifth and sixth stripes enclosing base of disco-cellulars; apex of cell of hind wings closed by a slightly-curved stripe with dark margins, between which and the third stripe is a short and somewhat oblique pale line. *Fore wings*:—A submarginal series of six conspicuous oblong-oval black spots, with dusky fuscous margins inwardly bordered by a pale narrow and somewhat obscure line, outwardly by a narrow and rather waved stripe; spot at anal angle small and sometimes divided; a submarginal rather waved whitish line. *Hind wings*:—A submarginal series of six large black sub-oval spots with bright fuscous margins, the margins twice as broad outwardly; spot at apex the smallest; two white submarginal

lines, the outer rather indistinct, the inner very distinct and angled at apex of third median nervule, where the wing is produced into a conspicuous and rather sharp tail; a large bright fuscous blotch at anal angle containing two round black spots with fuscous margins, and enclosed in narrow black and white lines. *Under side*:—Markings similar to those above, but much paler, or with an indistinct greenish tint, the white submarginal stripes broader and more distinct: the lower half of spot at anal angle obscured by a blackish blotch. Exp. 60 mm.

Hab. Ugi, Solomon Islands.

Obs. Allied to *C. lælia*, Feld., but ground colour different and fascia, especially on hind wings, much narrower.

Cyrestis nitida, n. s. (Pl. IV., fig. 5).

♂. *Upper side* dark olive-brown; a white band crosses both wings from costal nervure nearly to anal angle of hind wings; between white band and base several narrow pale ochreous stripes, the first slightly oblique from near base of costal nervure to submedian nervure of hind wing, the second short and across cell only, the third from costa at middle of cell obliquely to submedian nervure of hind wing, the fourth in cell almost straight, from thence to lower median nervule of hind wing it is much broader, of a deeper colour, and somewhat suffused, and where it crosses cell of hind wing it is inwardly bordered by a narrow pale line margined with darker brown; two more stripes at end of cell of fore wings, the inner one merely a fine line, the outer somewhat curved. *Fore wings*:—A conspicuous submarginal band, composed of a series of six moderately large black sub-oval spots with broad fuscous margins, inwardly bordered by a narrow whitish and somewhat clouded stripe, and outwardly by a broader whitish stripe; two submarginal darker stripes with a rather waved whitish line between. *Hind wings*:—Submarginal bands and stripes as in fore wings, but black spots larger, and the first two with much broader outer fuscous margins than the others; at anal angle a large bright fuscous patch, in which are situated two spots, one at anal angle with black centre and fuscous margins, and enclosed by a narrow black ring which is outwardly bordered by a fine white line, the other at the apex of and below lower median nervule, smaller, and with the markings less distinct. *Under side* white, and submarginal bands the same as on upper side, but the black spots with much broader fuscous margins, and the pale ochreous bands

replaced by white; the narrow white submarginal stripes broader and more distinct; spots at anal angle smaller. Exp. 60 mm.

Hab. Treasury Island, Solomon Islands.

Obs. Allied to *C. lælia*, Feld., but white band quite straight on outer edge and much narrower, and barely extending beyond costal nervure. It is altogether a larger insect.

Diadema fuliginescens, n. s. (Pl. IV., fig. 6).

♀. *Upper side* deep fuliginous-black, inclining to fuscous towards the outer margins. *Fore wings*:—A curved band of five white spots beyond the middle extending from costa to third median interspace, the spot between costa and costal nervule divided by a nervule; spot between discoidal nervules much the largest and elongated; indications of spots between first and second median nervules and first median nervule and submedian nervure; three or four small white apical spots; a submarginal row of small white spots bordered outwardly by a narrow black stripe. *Hind wings*:—Outer margin with a broad whitish band clouded with sepia towards junction with discal area and at apex; a row of white spots through the centre between the nervules; nervules crossing bands and between spots well-defined and deep pitchy-brown, outer margins the same, but narrowly and well-defined; fringes white, except at the apex of each nervule, where they are dusky. *Under side*:—Markings much the same as on upper side; basal and central area dark sienna-brown, brighter in cell. *Fore wings*:—Basal portion of costal area irrorated with minute bluish-white atoms; three white spots with black margins in cell just below costal nervure, minute bluish-white atoms between the two nearest the apex, and a blotch of the same below the central one; apex light brownish-ochreous; a narrow dark submarginal stripe bordered on each side by white, and a submarginal row of somewhat indistinct white spots, the one at anal angle the largest and enclosed in dark sienna-brown, and with a light bluish triangular spot above it. *Hind wings*:—The marginal band considerably broader than on upper surface, and with a distinct dark band running through its centre, in which the white spots are more clearly visible. Exp. 78 mm.

Hab. Ugi, Solomon Islands.

Obs. This species is allied to *D. Forbesii*, Butl., but differs in the shape of the apical spots, the costa is

more arched, and the band in the hind wings is not as broad or as white; it also comes near the female *D. velleda*, Cram., and is probably the female of a blue-banded species.

Parthenos thesaurus, n. s.

♂. *Upper side* obscure olive-brown. *Fore wings*:—An oblique discal band composed of a series of ten irregular-shaped spots margined with blackish-brown, the three at apex whitish, the remainder dusky: three streaks within the cell, the two nearest the base broad, oblique, pointing towards outer margin, of a brownish-ochreous edged with black; the third bordering disco-cellular nervule, broad above and filling apical angle of cell, of a paler colour than the other two, and having a few greenish atoms at its lower end; a moderate marginal and broad submarginal dusky band; two basal longitudinal blackish-brown streaks. *Hind wings*:—Basal third crossed by three blackish-brown bands, the first of which is almost straight; discal and marginal areas inclining to dark ochreous; a submarginal band of large blackish-brown lunules between the nervules, above which is a transverse band of large irregular linear-shaped spots outwardly concave, inwardly wedge-shaped, and somewhat toothed; outer margin blackish-brown. *Under side* paler than above. *Fore wings*:—The five lower discal spots tinged with greyish-green; a conspicuous black submarginal blotch at anal angle. *Hind wings*:—Basal half pale bluish-green and without the bands; two black lines between costal and subcostal nervures, and a waved black line across disc from subcostal to submedian nervule; the linear-shaped spots small, more or less streaked with pale blue atoms, and bordered below by a band of pale bluish-grey, and above by a band of oblique dusky spots; a submarginal band of linear-shaped lunules; outer margin dusky brown. Abdomen crossed by the usual bands. Exp. 100 mm.

Hab. Treasury Island, Solomon Islands.

Obs. Allied to *P. gambrisius*, Fabr., but much larger, and differs in general coloration, in shape, size, and colour of discal spots. In the former the spots between the first and third median nervules are very large and almost fill the interspace, whereas in *P. thesaurus* they are very much smaller and of different shape; the one between the first and second median nervule is long and narrow, and does not occupy more than one-third of the

interspace; the spot between the discoidal nervules is very different, as is also the coloration beneath, the general hue of *P. gambrisius* being greenish-olive.

LYCÆNIDÆ.

Lampides cærulina, n. s.

♂. *Upper side* pale silvery blue, through which the white markings beneath are faintly discernible. *Fore wings*:—A very narrow costal and hind marginal line, fringes dark blackish-brown. *Hind wings*:—A narrow white submarginal line very near the hind margin and bordered outwardly by a narrow black marginal line, and inwardly from upper median nervule to anal angle by blackish lunules, the first very indistinct; at anal angle a second short black streak just above the lunule. *Under side* greyish-brown, crossed by a series of irregular whitish lines. *Fore wings*:—A submarginal series of six dusky lunules. *Hind wings*:—A blackish-brown spot at apex followed by another much larger and almost square-shaped spot of the same colour, with its interior and outer margins white; a submarginal series of three blackish-brown ∧-shaped marks bordered above and below by white, the upper one placed between the discoidal nervules; between submedian nervure and third median nervule a conspicuous black submarginal spot bordered at the sides with metallic azure-blue, and inwardly by bright fuscous; at anal angle a few metallic azure-blue atoms on a black stripe inwardly margined by a short fuscous stripe; a marginal white line outwardly bordered by a blackish-brown line.

♀. *Upper side* pale silvery blue. *Fore wings*:—Costa narrowly, apex and hind margin broadly, blackish-brown; some indistinct submarginal lunules towards anal angle; an indistinct spot at end of cell. *Hind wings*:—Costa rather clouded; a double submarginal series of blackish-brown ∧-shaped marks, of which the first two of the inner series are the largest, and the two between upper and lower median nervules of the outer series the largest and darkest; a marginal narrow white line interrupted by the nervules and outwardly bordered by a narrow black line; fringes dark grey. *Under side* same as male. Tails black, with a minute white tip. Exp. 30 to 33 mm.

Hab. Ugi, Solomon Islands.

Obs. Allied to *L. ælianus*, Feld., but male has scarcely any black marginal band, and general colour is a paler and more delicate silvery blue. The submarginal markings on hind wing of female are different.

Sithon chromis, n. s.

Allied to *S. Phocides*, Feld., but differs in the anal area and tail being orange-ochreous, and in possessing a marginal, rather large, and broad triangular-shaped deep purple blotch near apex, instead of a short, narrow, blue band. Exp. 34 mm.

Hab. Ugi, Solomon Islands.

Amblypodia sophax, n. s.

♂. *Upper side* brilliant metallic azure-blue, shaded to ultramarine on costa and at apex; costa narrowly, hind margin more broadly, bordered with black; fringes blackish-brown; tail black, finely tipped with white. *Under side*:—Fore wings greyish-brown; spots and bands dark madder-brown, and very distinctly margined with greyish-white; two spots in and one at end of cell, the basal one small and round, the central and external ones large; a curved band of seven conspicuous spots between end of cell and outer margin; a submarginal lunular band. *Hind wings*:—Five basal spots, two large kidney-shaped spots in cell, one large spot on costa, followed by a conspicuous double spot, which forms the upper portion of an irregular discal series of six spots; a submarginal lunular band; a series of three metallic, greenish-blue, linear-shaped lunules at anal angle.

♀. *Upper side* not as brilliant as in male; costa narrowly, apex and outer margin broadly, black; *under side* same as in male. Exp. 35 to 40 mm.

Hab. Ugi, Solomon Islands.

Obs. General characters similar to others of the group, but a very brilliant and distinct species.

PAPILIONIDÆ.

PIERINÆ.

Pieris discolor, n. s.

♂. *Upper side* very pale creamy-white. *Fore wings*:—Costal area, apex, and hind margin deep blackish-brown; a series of six white linear-shaped spots in marginal band from costa to first median nervule, the upper very small, the next two the largest, and the other three very small and indistinct; costal area dusted with minute white atoms from base to end of cell; base of wing dusted with minute black dots. *Hind wings*:—An inwardly clouded black marginal band from costa, narrowing very gradually to anal

angle; an indistinct whitish spot on inner margin of band below subcostal nervule. *Under side*:—*Fore wings*, costal and marginal band as above, but black on costa extends into upper part of cell; spots at apex large and bright canary-yellow; base of wings yellow. *Hind wings* bright canary-yellow; hind-marginal band irregular, blackish-brown, with two yellow spots, the first between second subcostal and upper discoidal nervule, the second between first and second median nervules.

♀. *Upper side* pale canary-yellow; marginal bands broader, and apical spots rather larger than in male. *Under side*:—Fore wings pale lemon-yellow, base brighter; marginal band the same as above, but apical spots much larger, and bright orange. *Hind wings* orange; marginal band irregular, blackish-brown, and scarcely extending to anal angle; spots larger than in male; neuration across orange part of wings white. Exp. 65 mm.

Hab. Ugi, Solomon Islands.

Obs. A distinct species, but somewhat allied to *P. quadricolor*, Salv. and Godm. It is, however, considerably larger, differs in colour, and the marginal bands of the wings below are spotted.

PAPILIONINÆ.

Papilio polydæmon, n. s.

♂. *Upper side* black. *Fore wings*:—Three short and indistinct greyish streaks in cell, and duplex greyish streaks between the nervules. *Hind wings*:—A large white spot in cell near the end, and a series of large spots beyond, the first situated above the discoidal nervule, and the fifth, which has its lower part crimson, between lower median nervule and submedian nervure; a submarginal row of clouded crimson spots placed between the nervules, of which the upper three are almost obsolete, and the other three more or less irrorated with minute black dots, the one at anal angle being the brightest. *Under side*:—Fore wings same as above, but grey streaks broader and more distinct. *Hind wings*:—The submarginal row of crimson spots much larger and clear and unspotted; head and thorax above and below black; last three segments of abdomen scarlet beneath, the remainder black. Exp. 110 mm.

Hab. Ugi, Solomon Islands.

Obs. Allied to *P. polydorus*, L., but differs in the absence of the red collar and the red on thorax beneath,

and in size and shape of white spots in band on hind wings; the hind wings are not so pointed, and there is less grey on the fore wings.

Papilio polypemon, n. s.

Upper side blackish-brown. *Fore wings* with obscure greyish streaks in cell, and duplex streaks between the nervules. *Hind wings*:—A small white spot in cell towards end, and a series of small white spots just beyond, the first situated above discoidal nervule, and the fifth, which is much the smallest, between lower median nervule and submedian nervure; a submarginal row of six pale pinkish spots, the first four very indistinct, and the remaining two irrorated with black atoms. *Under side*:—*Fore wings* as above, but grey markings more distinct. *Hind wings*:—Submarginal row of spots almost circular, pale pink, and unspotted, the upper one whitish on its upper margin; two last segments of abdomen below and at sides bright pink; head, collar, thorax, and remainder of abdomen black. Exp. 98 mm.

Hab. Treasury Island, Solomon Islands.

Obs. Allied to above, but the hind wings are much shorter, the white spots much smaller and of different shape, the submarginal band paler and underneath of quite a different shape, and much further from hind margin. It is also considerably smaller.

Explanation of Plate IV.

Fig. 1. *Rhinopalpa pavonia*, ♀.
2. *Messarus tredecia*, ♂.
3. *Mycalesis sara*, ♂.
4. ,, *splendens*, ♀.
5. *Cyrestis nitida*, ♂.
6. *Diadema fuliginescens*, ♀.

VII. *Monograph of British* Braconidæ. Part II. By the Rev. T. A. Marshall, M.A., F.L.S., &c.

[Read February 2nd, 1887.]

Plate V.

IV. POLYMORPHI.

Of the ten subfamilies brought together under this heading, the two first only have a natural affinity. The others, as explained at the beginning of Part I., are isolated and heterogeneous, being, in fact, each of them the type of a higher division. To effect their rational arrangement it would be necessary to take into account all the exotic forms, when it would probably be found that many or most of the subfamilies and their genera, constituted for the reception of European species, would have to be modified or exploded. With regard to the first two subfamilies, they might be classed together as one group *Petiolarii*, equivalent to the *Arcolarii*, &c., established by Wesmael; but it would avail nothing to commence a system of division which could be carried no further.

XIV. EUPHORIDES.

Maxillary palpi 5—6-, labial 2—3-jointed. Occiput margined. Clypeus rounded, usually discrete, marked with a punctiform impression on each side of the base. Antennæ varying in length and in the number of the joints; in *Streblocera* geniculated and with an elongate scape; in *Eustalocerus* geniculated and clavate. Mandibles hardly bidentate. Mesothoracic sutures distinct or obsolete. Fore wings with 2 cubital areolets, sometimes obsolete; prædiscoidal often confused with the 1st cubital; radial either cultrate, reaching nearly to the tip of the wing, or minute, sublanceolate or semicordate, the metacarpus being then shorter or not longer than the stigma. Pobrachial areolet of the hind wings scarcely shorter than the præbrachial; præbrachial transverse nervure sometimes obsolete. Abdomen petiolated; suturiform articulation obsolete; segments 2—3 much longer than the rest,

which rapidly decrease in size to the anus. Terebra concealed or exserted.

The petiolated abdomen and two cubital areolets combine to distinguish this group from all others in Europe; but exotic species exist having three cubital areolets, and thus tending to coalesce with the next subfamily. The *Euphorides* of Förster take their name from *Euphorus pallidicornis*, Nees, ranked by that author erroneously among the *Oxyura*, subsequently transferred by Haliday and Curtis to the *Liophronides*, and to its present place by Reinhard and Förster simultaneously (1862). In its most recent acceptation the group comprises Section I. of the genus *Perilitus*, Nees (Act. Ac. L. C., 1819, p. 302), except his last species *P. conjungens*, which belongs to the *Exodontes*, genus *Chænusa*. Haliday in 1835 (Ent. Mag., iii., pp. 34—38) made two subgenera of *Perilitus*, which name he restricted to Section I. of Nees, giving to Section II. a new name, *Meteorus*. Wesmael, also in 1835, made two similar divisions of *Perilitus*, *Microctonus* and *Perilitus*, whereof the former represents *Perilitus*, Hal., and the latter *Meteorus*, Hal. A Prodromus of a monograph of *Microctonus* by Ruthe, containing only diagnoses, appeared in the Stett. Zeit. for 1856 (pp. 289—308), of which Reinhard published a *resumé*, with the addition of all other known species, in the Berl. ent. Zeits., 1862 (pp. 321—329); the names adopted by Reinhard are *Perilitus* for Section I. Nees, and *Meteorus* for Section II. Westwood, in 1833, discovered *Streblocera*; Ratzeburg, in 1848, *Cosmophorus*; and Förster (Verh. pr. Rheinl., 1862, p. 250) raised the total number of genera to 11. The views of Haliday and Wesmael (1835), and of Reinhard and Förster (1862) are substantially the same, but the coincidence of dates causes a difficulty in the choice of names. On the whole it seems preferable to keep *Perilitus* (= Section I. Nees = *Microctonus*, Wesm.) among the *Euphorides*, and to employ Haliday's *Meteorus* for the next subfamily. It is necessary therefore, in Part I., p. 10, for Subfam. 15, *Perilitides*, to read *Meteorides*. Some additional descriptions of *Euphorides* may be gathered from Curtis, B. E., 476, but they are insufficient, except where further interpreted by Haliday; the species figured by Herrich-Schäffer (Fn. Germ., 156) have been referred to their proper places by Reinhard.

Only four instances of the parasitism of these insects have been brought to light, from which it appears that they attack Coleoptera. *Cosmophorus Klugii*, Ratz., was bred out of *Polygraphus pubescens*, Er., and *Perilitus terminatus*, Nees, from adult *Coccinellæ*, but neither parasite has been noticed in England. *Euphorus pallidipes*, Cur., has been reared from *Orchesia minor*, Walk., and *Perilitus falciger*, Ruthe, from *Timarcha coriaria*, F.

Table of Genera.

(8) 1. Antennæ not geniculated.

(7) 2. First segment not longer than the rest of the abdomen; condylus wider than the petiole. Head smaller than the mesothorax.

(6) 3. Radial areolet semicordate or sublanceolate, ending much before the apex of the wing.

(5) 4. Maxillary palpi 5-jointed. Metathorax not vertically truncated nor excavated behind. Terebra concealed .. .. i. Euphorus.

(4) 5. Maxillary palpi 6-jointed. Metathorax vertically truncated and excavated behind. Terebra exserted .. .. v. Perilitus.

(3) 6. Radial areolet cultrate, nearly reaching the apex of the wing .. .. vi. Microctonus.

(2) 7. First segment longer than the rest of the abdomen; condylus not wider than the petiole. Head as large as the mesothorax ii. Wesmaelia.

(1) 8. Antennæ with one or two geniculations.

(10) 9. First cubital areolet distinct from the prædiscoidal. Antennæ ♀ clavate .. .. iii. Eustalocerus.

(9) 10. First cubital areolet not distinct from the prædiscoidal. Antennæ ♀ not clavate iv. Streblocera.

i. Euphorus; *Nees.*

Euphorus, Nees, Mon., ii., 360 (1834).
Leiophron, Cur., B. E., 476; Hal., Ent. Mag., ii., 462.
Euphorus and *Peristenus*, Först., Verh. d. pr. Rheinl., 1862, p. 251.

Clypeus transverse, rounded, fitting closely to the mandibles. Maxillary palpi 5-, labial 3-jointed. Antennæ straight, in the ♂ filiform, in the ♀ shorter, often submoniliform, and incrassated towards the apex. Head rotundo-cubic, as wide as the thorax, or wider. Occiput faintly marginal. Fore wings with 2 cubital areolets, sometimes obsolete; prædiscoidal areolet separated; radial areolet minute, semicordate or semilunate, ending not far

from the stigma, which is longer than the metacarpus; radius uniformly curved, its 1st abscissa often punctiform, or obsolete, the 2d cubital areolet, in the latter case, touching the stigma. Recurrent nervure interstitial; præ- and pobrachial areolets of equal length; stigma large, triangular. Mesothoracic sutures visible or obsolete. Metathorax elongate, not vertically truncate, nor excavated posteriorly. First abdominal segment sublinear, petiole and tubercles indistinct; segments 2—3 together covering most of the abdomen, segment 4 very short, the rest inconspicuous, mostly retracted. Terebra concealed, subulate or falciform, decurved; valves ovate, stout.

Nees von Esenbeck established this genus upon two female specimens of his *E. pallidicornis*, in which the discoidal and cubital areolets are nearly obsolete; hence he was led to place them among the *Oxyura*. Curtis, however, the year before, had already brought forward a number of English species under the name of *Leiophron*, with a figure of *L. apicalis*; but his descriptions of the others are mere outlines. Haliday, in the Ent. Mag. for 1834, redescribed most of the species of Curtis, and placed the genus upon a sound basis, though still under the name of *Leiophron*. Wesmael in the next year (1835) published two more species, *barbiger* and *clavi-ventris*, which he referred to a special section of his *Microctonus*, distinguished by having the terebra concealed. In 1856 Ruthe, in his paper on *Microctonus* in the Stett. Zeit., assembled twelve species known to Wesmael and himself, forming the last section of the genus. A list of all the species, under the name of *Euphorus*, is given by Reinhard in the Berl. ent. Zeits. for 1862, divided into the two sections devised by Haliday; and Förster in the same year gave to these sections generic rank under the names of *Peristenus* and *Euphorus*, the former of which is not here adopted.

Table of Species.

(2) 1. First abdominal segment scarcely longer than broad .. .. 1. *mitis*, Hal.

(1) 2. First abdominal segment 3—5 times longer than broad.

(14) 3. Mesothoracic sutures distinct and punctate.

(13) 4. Antennæ of the ♀ more than 16-jointed (except occasionally in Sp. 4); of the ♂ more than 17-jointed. Pobrachial areolet of the hind wing closed by a transverse nervure.

(10) 5. Mesothorax punctate.
(9) 6. Antennæ of the ♀ more than 18-jointed; of the ♂ 23—27-jointed.
(8) 7. Tubercles of the 1st abdominal segment inconspicuous .. .. 2. *pallidipes*, Cur.
(7) 8. Tubercles of the 1st abdominal segment prominent .. .. 3. *tuberculifer*, n. s.
(6) 9. Antennæ of the ♀ 16—18-, of the ♂ 19—21-jointed .. .. 4. *picipes*, Hal.
(5) 10. Mesothorax impunctate.
(12) 11. First abscissa of the radius very short; stigma not quite touching the 2d cubital areolet .. .. 5. *coactus*, Marsh.
(11) 12. First abscissa of the radius obsolete, so that the stigma touches the 2d cubital areolet .. .. 6. *accinctus*, Hal.
(4) 13. Antennæ of the ♀ 16-, of the ♂ 17-jointed. Pobrachial areolet of the hind wing not closed, the transverse nervure being abbreviated or obsolete.. .. .. 7. *similis*, Cur.
(3) 14. Mesothoracic sutures indistinct, impunctate.
(16) 15. Mesothoracic sutures inchoate, but vanishing posteriorly .. .. 8. *intactus*, Hal.
(15) 16. Mesothoracic sutures wholly effaced.
(20) 17. Colour testaceous, abdomen dark at the apex.
(19) 18. Wings infuscated, with or without a white transverse fascia. First abdominal segment linear, not sinuated at the base nor wider at the apex; tubercles inconspicuous .. .. 9. *apicalis*, Cur.
(18) 19. Wings hyaline. First abdominal segment not linear, sinuated at the base and widened towards the apex; tubercles prominent .. .. 10. *ornatus*, n. s.
(17) 20. Colour black or piceous.
(22) 21. Metathorax thickly punctato-reticulate. Antennæ ♀ not longer than the head and thorax, stout. Length, ½—¾ lin. 11. *fulvipes*, Cur.
(21) 22. Metathorax reticulated with larger irregular areæ. Antennæ ♀ not much shorter than the body, slender. Length, ¾—1 lin. .. .. 12. *parvulus*, Ruthe.

1. *Euphorus mitis*, Hal.

Leiophron mitis, Hal., Ent. Mag., ii., 463.

"Black, shining: antennæ a little shorter than the body, hardly filiform, 23-jointed, obscurely testaceous: mouth and palpi of the same colour. Sutures of the mesothorax converging posteriorly, punctate, the disk smooth in the middle. Metathorax granulated,

pubescent. First abdominal segment scarcely longer than broad, aciculated; the tubercles situated near the base; the extreme base constricted. Legs testaceous, the hind pair more obscure; coxæ blackish. Wings hyaline, nervures and stigma pale fuscous; radix and squamulæ testaceous. Apparently a ♀."—Haliday. Length, $1\frac{1}{3}$; wings, 3 lin.

Nothing more is known of this insect, to the description of which the following note is appended by the author: —"I have seen but one individual of this species, which appears to have sustained some injury to the pupa, as its wings are not fully expanded. Possibly the unusual shortness of the first segment may have been produced by accident also, as in its other characters the species agrees with those of the following section," *i. e.*, with *pallidipes*, &c.

2. *Euphorus pallidipes*, Cur.

Leiophron pallipes, Cur., B. E., 476, 1, and pl. ff. 1—9 (dissections and wing taken from this species).
Microctonus barbiger, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 69, pl. i. (wing); Ruthe, Stett. Zeit., 1856, p. 307, ♂, ♀.
Perilitus pallipes, Schäff., F. G., cliv., 13.
Microctonus brevicornis, Ruthe, *lib. cit.*, p. 306, ♂ ♀.
Leiophron orchesiæ, Cur., B. E., 476, 1*a*.

Black; antennæ at the base, and legs, rufo-testaceous; hind coxæ and tips of hind tibiæ and tarsi fuscous. Wings dull hyaline, squamulæ, stigma, and nervures rufo-fuscous; all the nervures distinct; stigma pale at the base, and not touching the 2d cubital areolet; hence the radial areolet is angulated under the stigma, strongly curved, semilunate; metacarpus about half as long as the stigma. Face covered with whitish pubescence. Prosternum smooth, shining. Mesothorax shining, impressed with large distant punctures. Metathorax reticulato-rugose. First abdominal segment gradually widened to the apex, which is twice as broad as the base, striolated; the other segments smooth and shining. ♂ ♀. Length, $1\frac{1}{2}$; wings, $2\frac{3}{4}$ lin.

Antennæ ♀ 21- 23- (seldom 24- or 25-) jointed, shorter than the body; those of the ♂ longer, 23—27-jointed. Head large; vertex prolonged behind the eyes; face subquadrate, covered with thick whitish pubescence, and with a row of long outstanding hairs above the clypeus. Mesothoracic sutures crenate, meeting some-

what acutely before the scutellum. Metathorax regularly convex, pubescent. First segment occupying about $\frac{1}{3}$ of the abdomen, insensibly widened from the base to the apex; the tubercles inconspicuous; segments 2—3 connate, together equal to $\frac{2}{3}$ of the rest of the abdomen, which is ovate, convex, smooth, and shining. Radial areolet smaller than the stigma, which is large and sub triangular, more or less dark fuscous, and sometimes not paler at the base. Pobrachial areolet of the hind wings closed.

Var. *α*. Head rufous; stemmaticum black; antennæ testaceous, tipped with fuscous. *L. orchesiæ*, Cur.

Var. *β*. Antennæ as in the preceding; legs testaceous, hind coxæ blackish. ♂ ♀. Ruthe.

Var. *γ*. More slender; head, pro- and mesothorax, with the scutellum, rufous; antennæ almost wholly, as well as the legs, testaceous; 2d abdominal segment piceo-rufous. ♂. Ruthe, Wesmael.

Described from 8 females, 28 males, including two of var. *α*: 14 males have 24-jointed, and 5 females 22-jointed antennæ.

The limits of this species can hardly be fixed without more knowledge than we possess at present. *M. brevicornis*, Ruthe, may be distinct, appearing doubtful on account of the shortness and thickness of the antennæ in the female; there are, however, intermediate forms, and a separate species could not well be maintained upon this character alone. Nees v. Esenbeck seems to be the only continental writer unacquainted with this abundant insect. Var. *α*, according to Curtis, was bred by Walker from *Orchesia minor*, Walk., one of the two recorded instances of the rearing of an insect of this subfamily in England: *cf.* Boie, Nat. Tidsk., iii., 315.

The species is common throughout the country.

3. *Euphorus tuberculifer*, n. s.

Præcedenti persimilis, triplo minor. Niger, abdomine post segmentum 1um piceo, antennarum basi pedibusque, cum coxis omnibus, testaceis, tibiis tarsisque posticis apicem versus fuscescentibus. Alæ hyalinæ, squamulis, nervis, testaceis, stigmate fusco, ad basin hyalino, areolam cubitalem 2dam non attingente. Radii abscissa 1ma brevissima, punctiformis. Abdominis segmentum 1um postice ampliatum, tuberculis prominulis.

Very like *pallidipes*, but much smaller. Black, abdomen after

the 1st segment piceous; antennæ at the base, and legs, including all the coxæ, testaceous; hind tibiæ and tarsi fuscescent towards the apex. Wings hyaline, squamulæ and nervures testaceous, stigma brown, hyaline at the base, not touching the 2d cubital areolet; 1st abscissa of the radius very short, punctiform. First abdominal segment widened behind; tubercles prominent. ♂ ♀. Length, $1\frac{1}{4}$; wings, $2\frac{1}{3}$ lin.

Antennæ of the ♂ 24-jointed, rather longer than the body; of the ♀ shorter than the body, 20-jointed. Head and thorax as in *pallidipes*, but the face is not pubescent. Mesothoracic sutures crenate, conniving before the scutellum; medial lobe thickly, and scutellum sparingly, punctate. Metathorax punctato-rugulose. First abdominal segment of the ♀ striolated, slender and coarctate at the base, widened to the tubercles, which are prominent and acute; thence to the apex the sides are nearly parallel, the apex being twice as broad as the base; the same segment of the ♂ differs in being a trifle narrower. The rest of the abdomen is rufo-piceous, darker posteriorly. The wings differ from those of *pallidipes* in that the 1st abscissa is punctiform, so that the stigma almost touches the 2d cubital areolet; the radius is somewhat obtusely rounded beneath the stigma; the latter is larger; the nervures paler and more obsolete. Pobrachial areolet of the hind wings closed.

Described from two males taken at Nunton, Wilts, and one female from the Isle of Wight.

4. *Euphorus picipes*, Hal.

Leiophron picipes, Hal., Ent. Mag., ii., 464, ♂ ♀ (not of Curtis).

Antennæ ♀ 16—18-jointed, subclavate, not longer than the head and thorax; of the ♂ 19—21-jointed, shorter than the body. Black, abdomen after the 1st segment inclining to piceous; antennæ and legs testaceous, the former towards the apex, the latter with the hind coxæ more or less, and sometimes the tips of the hind tibiæ, fuscous; or the fore legs pale piceous, the posterior darker, and the hind coxæ black. Wings dull hyaline, squamulæ, stigma, and nervures piceous, more or less pale; stigma hyaline at the base and not reaching the 2d cubital areolet. Face not remarkably pubescent. Mesothorax shining, punctate. Metathorax minutely reticulato-rugose. First abdominal segment gradually widened to the apex, which is twice as broad as the base, striolated; the other segments smooth and shining. ♂ ♀. Length, 1—$1\frac{1}{3}$; wings, 2—$2\frac{2}{3}$ lin.

Similar to *pallidipes*, and to be distinguished chiefly by the antennæ, which have fewer joints, and in the female are remarkably short, and incrassated towards the tips; it is also a smaller insect. Radial areolet narrower, and 1st abscissa of the radius shorter, almost punctiform. Metacarpus half as long as the stigma. Legs somewhat stouter, and all their articulations therefore in appearance shorter. This is unquestionably Haliday's *picipes*, from his description of the antennæ. Reinhard has given *Microctonus relictus*, Ruthe (Stett. Zeit., 1856, p. 305) as a synonym. But Ruthe separates *relictus* from *pallidipes* by the 1st abscissa of the radius, stated to be entirely obsolete in the former. This cannot be said of the present insects, nor is it mentioned by Haliday. On the other hand, Ruthe is silent about the antennæ of *relictus*; above all he does not say that those of the male are usually 18-jointed, a character peculiar to the present species. It follows that *picipes*, Hal., and *relictus*, Ruthe, cannot be identical. The *Leiophron picipes*, Cur., is also distinct; see the following species.

Described from seven males and two females taken on the banks of the Usk near Abergavenny, in Leicestershire, Herts, and Wilts. Capron reports it as common at Shiere, near Guildford; he has taken five females, one male.

5. *Euphorus coactus*, Marsh.

Leiophron picipes, Cur., B. E., 476, 2, ♀ (not of Haliday).

Antennæ ♀ 16-jointed, short, subelavate. Black, abdomen after the 1st segment, legs, and antennæ piceous, the last paler at the base. Wings hyaline, squamulæ, stigma, and nervures rufo-fuscous; stigma hardly paler at the base, not reaching the 2d cubital areolet; 1st abscissa of the radius very short; radial areolet not angulated under the stigma, semilunate; metacarpus as long as ½ the stigma. Mesothorax shining, impunctate; sutures distinct, smooth, conniving in an angle before the scutellum, and not effused into a punctate space. Metathorax uneven, dull, thickly punctulate. First abdominal segment striolated, gradually widened to the apex, which is twice as broad as the base; the other segments smooth and shining. ♀. Length, 1; wings, 2 lin.

Antennæ submoniliform, stout, not longer than the head and thorax, gradually incrassated to the apex. Head large, impunctate,

shining; vertex prolonged behind the eyes. Mesothorax as in *pallidipes*, but destitute of punctures. Wings also like those of *pallidipes*, but the 1st abscissa is shorter, almost punctiform; nervures distinct. Legs stout, short, piceous; tibiæ and tarsi paler than the femora.

Distinguished from *picipes*, Hal., by its impunctate mesothorax, smaller size, and darker legs; compared by Curtis to his *similis*, while Haliday compares his *picipes* to *pallidipes*, Cur. It is highly probable that the synonymy given by Haliday under *picipes* is an oversight, and it is necessary therefore to impose a new name upon one of the species there apparently confused. But the materials at hand are insufficient to decide the difficulty absolutely.

Described from two females taken near Barnstaple.

6. *Euphorus accinctus*, Hal.

Leiophron accinctus, Hal., Ent. Mag., ii., 465.

"Head, thorax, and petiole black; abdomen piceous; antennæ at the base, and legs, ferruginous. Wings hyaline, radix and squamulæ stramineous, stigma pale brown, lighter at the base, and touching the 2d cubital areolet. Petiole of the abdomen nearly linear, rugulose, the tubercles acute, slightly prominent." ♂. Length, 1¼; wings, 2½ lin.

"Antennæ 22-jointed, slender, hardly shorter than the body, fuscous, ferruginous at the base. Mesothoracic sutures crenate, conniving before the scutellum; medial lobe impunctate; scutellum obsoletely punctate. Metathorax minutely rugulose. First abdominal segment nearly linear, longitudinally rugulose, somewhat coarctate before the tubercles. Radial areolet narrow, acuminated beneath the stigma."—Haliday.

I have not seen this species.

7. *Euphorus similis*, Cur.

Leiophron similis, Cur., B. E., 476, 4; Hal., Ent. Mag., ii., 465, ♀.

Microctonus oblitus, Ruthe, Stett. Zeit., 1856, p. 303, ♀.

Black; abdomen after the 1st segment piceous; antennæ testaceous, their apical half fuscous; legs testaceous, more or less inclining to piceous, hind coxæ piceous at the base. Wings hyaline, squamulæ and nervures testaceous, stigma large, pale brown or

testaceous, its basal third hyaline; 1st abscissa of the radius obsolete, so that the 2d abscissa and the intercubital nervure spring immediately from the stigma; radial areolet very minute. Mesothoracic sutures distinct. First abdominal segment elongate, linear, the tubercles inconspicuous. ♀. Length, ¾—1; wings, 1½—2 lin.

Var. Rufo-testaceous, metathorax and apex of the abdomen fuscous. Ruthe. *Cf.* sp. 10, which is similarly coloured, but without visible mesothoracic sutures.

Antennæ ♀ 16-jointed, somewhat incrassated towards the tips, as long as the head, thorax, and petiole. Head and thorax impunctate. Mesothoracic sutures shallow, converging into a small dull space before the scutellum, which is smooth and shining. Metathorax finely reticulated. Abdomen piceous, paler and often rufous on the 1st segment and base of the 2d; segment 1 slender, almost linear, punctato-reticulate, coarctate at the base, and nearly ⅓ of the whole length of the abdomen; tubercles inconspicuous; the rest of the segments form a short convex oval. Pobrachial areolet of the hind wings open.

Described from six females. Generally distributed.

8. *Euphorus intactus*, Hal.

Leiophron intactus, Hal., Ent. Mag., ii., 465, ♀.

Piceous, head and thorax darker; abdomen rather rufo-piceous; antennæ and legs very pale piceous. Wings dull hyaline, squamulæ, stigma, and chief nervures pale yellowish, the others decolorous; stigma hyaline at the base, touching the 2d cubital areolet; radial areolet angulated beneath the stigma, semilunate, the metacarpus shorter than ⅓ of the stigma. Pobrachial areolet of the hind wings open. Mesothorax smooth, shining, impunctate, the sutures obsolete, except a wrinkled depression before the scutellum. Metathorax thickly punctulate, somewhat shining. First abdominal segment linear, punctato-reticulate; the rest smooth. ♀. Length, ¾—1; wings, 1½—2 lin.

Antennæ 16-jointed, nearly filiform, somewhat incrassated and fuscescent towards the apex, as long as the body. Entirely smooth and shining, except the metathorax and 1st abdominal segment. Mesothoracic sutures none, or only vestiges remain, *viz.*, two short shallow grooves in front, and a slight depression before the scutellum. First abdominal segment linear, slightly curved, coarctate at the base; tubercles medial, somewhat salient. The colour of the legs and antennæ is pale piceous, or, as Haliday calls

it, silaceous, as distinguished from flavo- or rufo-testaceous. Before the scutellum is a tranversely oval fovea, bisected by a carina. Distinguished from *fulvipes*, Hal., by longer and more slender antennæ; from *parvulus*, Ruthe, by longer antennæ; from both by having traces of the mesothoracic sutures.

Reinhard conjectures this to be *Microctonus clariventris*, Wesm., ♀ (Nouv. Mém. Ac. Brux., 1835, p. 71), but Wesmael's description is inconclusive through the omission of all mention of the mesothoracic sutures; moreover, the types in the Brussels Museum do not correspond with the description, and the whole is rendered useless.

Described from two females taken in Epping Forest.

9. *Euphorus apicalis*, Cur.

Leiophron apicalis, Cur., B. E., pl. ccccIxxvi, ♂; Hal., Ent. Mag., ii., 466, ♂ ♀.

Microctonus fascipennis, Ruthe, Stett. Zeit., 1856, p. 302, ♂ ♀.

Rufo- or flavo-testaceous, antennæ at the tips, apex of the abdomen (sometimes also the metathorax, pleuræ, and pectus of the ♀) fuscous; hind femora and tibiæ in the middle rarely infuscated. Wings fuscescent, with a broad whitish transverse fascia including the base of the stigma, the rest of which is brown; when the wings are paler this fascia is absent: cubital and anal nervures very faint, and their transverse nervures indistinct. Metathorax elongate, horizontal, subtruncate. Abdomen clavate, 1st segment slender, linear, curved; tubercles not prominent. ♂ ♀. Length, 1—$1\frac{2}{3}$; wings, $1\frac{3}{4}$—$2\frac{3}{4}$ lin.

Variable in size, and in colour from flavo-testaceous to rufous; abdomen from the hinder edge of segment 2 to the apex always blackish. The base of the petiole, the metathorax, pleuræ, and pectus of the ♀ frequently fuscous; near the radix of the wings is a fuscous dot. Fore wings infuscated from about the præbrachial transverse nervure, and gradually paler thence to the apex, crossed by a broad whitish fascia under the stigma; this coloration is less obvious in smaller specimens, especially males, and at length disappears, as in that figured by Curtis. Costa and præbrachial transverse nervure brown; the other nervures not distinct. Pobrachial areolet of the hind wings open. Eyes during life green; ocelli fuscous. Antennæ ♂ 17—19-jointed; of the ♀ 16-jointed; the two apical joints imperfectly divided; 3d joint elongate.

Sutures of the mesothorax obsolete; the disk smooth, except a few minute transverse wrinkles. Metathorax punctato-reticulate, elongate, horizontal, abruptly rounded, or almost truncate, posteriorly. First abdominal segment punctate, slender, curved, elongate, not wider at the apex; tubercles antemedial; the rest of the abdomen pyriform, smooth, shining; in the ♂ the apex is truncated.

Walker first discovered at Southgate the ♂ which was figured and described by Curtis. Haliday must have had several specimens of both sexes, but without coloured wings. Ruthe's examples, three males, one female, appear to have been typical; they were taken in the Brieselanger Forest, near Berlin, in May and June. The species occurs in England not uncommonly, especially in North Devon, where I once captured a good series of intermediate forms, enabling me with confidence to unite *apicalis*, Cur., with *fascipennis*, Ruthe. Others have occurred singly, in the London district, taken by Billups, and by myself at Nunton, Wilts; another is in Fitch's collection. Van Vollenhoven records the rearing of a specimen from an unlikely source, *viz.*, the case of a *Coleophora*.

10. *Euphorus ornatus*, n. s. (Pl. V., fig. 1).

Testaceus, oculis, abdominis triente postico, nigris; segmento 1mo et metathorace piceis; antennis apicem versus infuscatis. Alæ hyalinæ, nervis pallidis, stigmate picescente basin versus hyalino, cellulis discoidalibus obsoletis; alæ posticæ fere enerves. Mesothorax lævissimus. Metathorax punctatus, subelongatus, vix declivis, apice subtruncatus. Abdominis segmentum 1mum rugulosum, postice nonnihil ampliatum, antice coarctatum, tuberculis prominulis; cætera lævissima.

Testaceous, eyes, and apical third of the abdomen, black; metathorax and first abdominal segment piceous; antennæ infuscated towards the tips. Wings hyaline, nervures pale, stigma pale piceous, its base hyaline; discoidal areolets obsolete; hind wings without visible nervures. Mesothorax entirely smooth. Metathorax punctate, subelongate, almost horizontal, subtruncate posteriorly. First abdominal segment rugulose, coarctate at the base, somewhat widened after the prominent tubercles; the rest smooth and shining. ♂. Length, $1\frac{1}{4}$; wings, $2\frac{1}{4}$ lin.

Antennæ 17-jointed, incrassated towards the apex, a little shorter than the body.

Regarding the colours of this insect as fallacious, I have tried to connect it by structure only with some of the dark species. The perfect smoothness of the mesothorax separates it from all those above described except *apicalis*, and from this it is easily distinguished at a glance, as in the table of species. It is much too large to be compared with either of the following species, *fulvipes* or *parvulus*. On the whole it most resembles *similis*, Cur., a common species, and said to have a pale variety; but the structure of the mesothorax does not agree. It would not be surprising if the character derived from the development or suppression of the mesothoracic sutures should be found hereafter to be valueless, although Förster founds a genus upon it, but at present there is no ground for such an assumption. There remains the pale variety of Wesmael's *Microctonus claviventris*, already referred to under sp. 8. The mesothorax of this species is not characterised by Wesmael, and, in order to arrive at some conclusion I applied to M. de Borre, of the Musée Royal at Brussels, who took great pains, with the assistance of Dr. Jacobs, to examine Wesmael's types of this and allied species. The conclusions at which they arrived are that *Euphorus ornatus* is not identical with any species in Wesmael's collection, and further, that the insects standing under the name *claviventris* as types, two in number, do not represent that species, and do not correspond with the text of the "Braconides de Belgique," while the so-called varieties are a mixture of other species.

The single example of *E. ornatus* was taken in a wood close to my house at Nunton, Wilts.

11. *Euphorus fulvipes*, Cur.

Leiophron fulvipes, Cur., B. E., 476, 5; Hal., Ent. Mag., ii., 466, ♂ ♀.

Antennæ ♀ 16-jointed, stout, not longer than the head and thorax. Piceous, antennæ at the base, and legs, pale testaceous. Wings dull hyaline, squamulæ and nervures pale testaceous, stigma pale brown, hyaline at the base, touching the 2d cubital areolet; radial areolet angulated beneath the stigma, semilunate, the metacarpus shorter than ½ of the stigma. Mesothorax smooth and shining, the sutures obsolete. Metathorax punctato-reticulate.

First abdominal segment also punctato-reticulate, linear; the other segments smooth. Antennæ ♂ longer and more slender. ♂ ♀. Length, $\frac{1}{2}$—$\frac{3}{4}$; wings, 1—$1\frac{3}{4}$ lin.

I have not seen the ♂, but the short antennæ of the ♀ are very distinctive. The first abdominal segment is shorter than in the allied species, coarctate at the base, and very slightly dilated beyond the antemedial tubercles. Legs rather short. Capron is of opinion that this species may prove to be a form of the following.

Common, according to Haliday, in grassy hedgerows. My only specimen was taken near Teignmouth.

12. *Euphorus parvulus*, Ruthe.

Leiophron pallidistigma*, Cur., B. E., 476, 6; Hal., Ent. Mag., ii., 466, ♀.

Microctonus parvulus, Ruthe, Stett. Zeit., 1856, p. 302, ♂ ♀.

"Antennæ ♀ 16-jointed, slender, shorter than the body. Black; abdomen, after the 1st segment, piceous; antennæ and legs pale piceous, hind coxæ infuscated at the base. Wings hyaline, squamulæ and stigma stramineous, or the latter pale piceous. More elongate than *fulvipes*, the legs and petiole more slender. Mesothorax smooth and shining, the sutures obsolete. First abdominal segment punctato-reticulate, linear, slightly coarctate at the base, the tubercles medial." ♀. Haliday. Length, $\frac{3}{4}$—1; wings, $1\frac{1}{2}$—2 lin.

I have only one specimen, in bad condition, which is shown by its antennæ to belong to this species. The antennæ of *fulvipes* are shorter and stouter. *E. intactus* has the antennæ not stouter but longer; the mesothorax, moreover, exhibits traces of sutures. According to Reinhard *pallidistigma*, Cur., is identical with *parvulus*, Ruthe. The diagnosis of the latter includes both sexes, and is as follows:—

"Black, shining, slender, antennæ and legs testaceous; antennæ towards the apex (mostly in the ♀), and hind coxæ at the base, more obscure; head and mesothorax very smooth and shining, the former subcubic, the latter with no visible sutures; metathorax somewhat narrowed posteriorly, descending in a regular curve from

* "*Pallidistigma*" is the older name, but *parvulus* is preferred here as involving no mistakes in sense or form.

the base almost to the apex, finely rugulose and subreticulated; 1st abdominal segment nearly straight, hardly widened behind, punctato-rugulose; tubercles slightly prominent. Wings dull hyaline, nervures distinct, radius strongly curved, radial areolet very narrow, stigma subfuscous (pale in the ♂), more or less whitish at the base. Antennæ ♂ 17-jointed.

"Described from three males, twelve females. Not uncommon near Berlin from the end of May to the beginning of June."

My specimen was taken near St. Albans.

ii. Wesmaëlia, *Först.*

Först., Verh. pr. Rheinl., 1862, p. 251; Marsh., E. M. M., 1872, p. 257.

Male unknown. Antennæ ♀ filiform. Fore wings with 2* cubital areolets; prædiscoidal separate; radial areolet semicordate; metacarpus not longer than the stigma; radius slightly curved;

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* The following is an undescribed exotic form, having 3 cubital areolets, but belonging in all other respects to the *Euphorides*, and nearly allied to *Wesmaëlia*.

Aridelus, n. g.

Antennæ feminæ filiformes. Palpi maxillares 6-articulati. Areolæ cubitales tres; prima cum prædiscoidali confusa, secunda parva, oblonga, extus aperta; areola radialis lanceolata; metacarpus stigmate brevior; radius subcurvatus. Alæ inferiores areola radiali petiolata. Mesothoracis sulculi nulli. Abdominis segmentum primum sublineare, segmentis cæteris simul sumptis æquale. Statura omnino *Wesmaëliæ*. Terebra vix subexserta.

Aridelus bucephalus, n. s.

Rufo-testaceus, antennis (præter articulos 5 apicales), oculis, stemmatico, mesothoracis maculis 2 humeralibus, tibiarum posticarum apice, tarsorum anteriorum articulo ultimo, tarsis posticis totis, terebræ etiam valvis, nigris. Alæ nigricantes squamulis rufo-testaceis, nervis et stigmate nigris, linea sub hoc albicante.

Rufo-testaceous, antennæ (except the 5 apical joints), eyes, stemmaticum, two humeral spots on the mesothorax, apex of hind tibiæ, last joint of 4 anterior tarsi, hind tarsi altogether, and valves of the terebra, black. Wings blackish, squamulæ rufo-testaceous, nervures and stigma black; beneath the latter is a whitish line. ♀. Length, 2¼; wings, 4 lin.

Antennæ rather shorter than the body, moniliform, the joints oblong; 18-jointed, joints 1—13 black, the rest abruptly testaceous. Head and body formed as in *Wesmaëlia*, smooth and shining except the thorax, which is covered with circular reticulations, or variolose, and less shining. Segment 1 proportionally rather shorter than in *Wesmaëlia*, curved only near the apex, where it is

pobrachial areolet hardly longer than the præbrachial; recurrent nervure rejected. First abdominal segment longer than all the rest taken together, slender, curved, not wider behind, having the spiracles just before the middle, where it is not tuberculated but slightly incrassated, and again decreasing gradually from thence to the apex: the other segments forming a small compressed oval. Terebra subexserted.

1. *Wesmaëlia cremasta*, Marsh. (Pl. V., fig. 4).

Wesmaëlia cremasta, Marsh., *l. c.*, ♀.

Testaceous; eyes, stemmaticum, and valves of the terebra, black; antennæ infuscated towards the apex; metathorax rufescent, becoming piceous or blackish posteriorly. Wings hyaline; stigma yellow, edged beneath with fuscous; nervures testaceous. Length, $1\frac{2}{3}$; wings, 3 lin.

Distinguished from all other genera of this group by the form of the abdomen, which resembles that of an *Ammophila* or *Pelopæus*. Antennæ 26-jointed, slender, as long as the body. Head rotundo-cubic, wider than the thorax, and equal in bulk to the entire mesothorax; vertex ample, convex; eyes prominent; clypeus not discrete, foveated on each side at the base, protruded at the apex, so that a fissure appears between it and the mandibles, which are bidentate. Prothorax deeply sunk between the elevated head and mesothorax; the latter trilobate, not longer than the head. Metathorax short, rugulose, abruptly truncated behind, and there triangularly excavated. Abdomen smooth and shining; 2d and 3d segments completely connate, concealing the rest, except the extremity of the last segment. Legs long and slender. Terebra very short, subulate, pointing upwards.

Described from two specimens; one taken in North Devon, the other at Bielsa in the Spanish Pyrenees.

iii. Eustalocerus, *Först.*

Rhopalophorus, Hal., in Westw. Int., ii., App. 61 (name preoccupied in Coleoptera).

Eustalocerus, Först., Verh. pr. Rheinl., 1862, p. 251.

Male unknown. Antennæ ♀ clavate and geniculated; the first

hardly widened; tubercles obsolete; the other segments are concealed under the 2d and 3d, ovate above, pyriform if viewed laterally, and not so strongly compressed. Legs shorter and stouter. Terebra hardly exserted, its valves dilated at the extremity, compressed, and black.

Taken in the island of Trinidad.

joint elongate. Second joint of the maxillary palpi dilated. Two cubital areolets, the 1st separated from the prædiscoidal. Radius not much curved. Terebra exserted.

1. *Eustalocerus clavicornis*, Wesm. (Pl. V., fig. 3).

Microctonus clavicornis, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 65; S. v. Voll., Schets. Bracon., tab. iv. (wing and antenna by Haliday).

Black; antennæ dull testaceous; clypeus at the apex, mandibles, palpi, and legs, testaceous; hind legs slightly infuscated. Wings subfusco-hyaline, stigma black, nervures stout, blackish. Terebra as long as $\frac{2}{3}$ of the abdomen. ♀. Length, 1 lin.

Antennæ about twice as long as the head, 10-jointed, the 1st joint forming $\frac{1}{3}$ of the entire length, the 2d obliquely inserted, making a geniculation with the 1st, very short and stout; 3d more slender and twice as long; 4—9 shorter, and successively diminishing in length; 10th almost as long as the three preceding taken together, and appearing, when highly magnified, as if superficially divided into 4 or 5 rings. Head as broad as the thorax; vertex somewhat short; face granulated, obscure. Metathorax short, rugose, abruptly truncated behind. First abdominal segment much widened from the middle to the apex; tubercles prominent; immediately above them are two deep impressions, behind which the segment is longitudinally rugulose; the lines of rugosity are few, and do not quite reach the apex. Valves of the terebra black, very slightly widened towards the extremity.

This description is Wesmael's, who discovered the ♀ in an osier-ground in Belgium, May 27th. A British specimen was known to Haliday, who created a new genus for its reception, but left no written record of the species, and this has not been met with since.

iv. Streblocera, *Westw.*

Westw., Phil. Mag., 1833, p. 342; Int., ii., 61; Tijdschr. v. Ent., 1881—82, p. 44; Nees, Mon., ii., 411.

Antennæ seated upon two frontal tubercles, the 1st and 3d joints, or the 1st only, elongate; with 1—2 geniculations in the ♀, 2 or none in the ♂. Fore wings with 2 cubital areolets, the 1st not separated from the prædiscoidal; radial areolet remote from the tip of the wing; radius curved. Mesothoracic sutures distinct. Abdomen with a short petiole. Terebra exserted or subexserted.

Two species are referred to this singular genus; their characters are so discrepant that it is very easy to distinguish them:—

Antennæ ♂ ♀ with two geniculations; terebra subexserted .. .. 1. *fulviceps*, Westw.
Antennæ ♂ filiform; of the ♀, with one geniculation; 1st joint elongate in both; terebra nearly as long as ½ the abdomen .. .. 2. *macroscapa*, Ruthe.

1. *Streblocera fulviceps*, Westw. (Pl. V., fig. 2).

Streblocera fulviceps, Westw., Phil. Mag., *l. c.*; Int., ii., 138, f. lxxv., 19 (antenna), 20 (wing), and p. 154; Tijdschr. v. Ent., 1881—82, p. 45, pl. viii., f. 6, ♀, f. 7 (antenna ♀), f. 8 (antenna ♂); S. v. Voll., Schets. Bracon., tab. iv.

♀. Black or piceous; head and 3 basal joints of the antennæ ferruginous, the following joints fuscous; eyes and stemmaticum blackish; legs testaceous, tibiæ at the tips, and tarsi, hardly infuscated. Wings hyaline, nervures, stigma, and squamulæ testaceous; præbrachial nervure distinct; radial areolet semicordate, ending nearer to the tip of the wing than to the stigma; radius regularly curved. Head large, wider than the thorax; vertex elevated, transverse; occiput broadly excavated. Antennæ 16-jointed; 1st joint longer than the head, incrassated, armed with a curved tooth beneath, beyond which it is sinuated; 2d short, obliquely articulated with the preceding, forming an acute angle; 3d shorter than the 1st, incrassated and curved; 4th obliquely inserted before the apex of the 3d, forming another angle; joints 4—16 (the flagellum) moniliform. Metathorax short, truncated posteriorly, slightly excavated, uneven, scarcely shining. First abdominal segment twice as long as its apical breadth, the tubercles situated beyond the middle; segment 2 twice as long as 3; 4 and following very short; abdomen (exclusive of the 1st segment), viewed from above, ovate, much shorter than the thorax. Terebra hardly exserted, the valves stout, black.

♂. Antennæ 19-jointed, 1st and 3d joints elongate, incrassated, 2d and 4th obliquely inserted, forming two geniculations; joints 4—19 filiform. I have not seen the ♂, and this is borrowed from the figure in the Tijdschrift; in the description it appears that by some accident the signs of the sexes (♂ ♀) have been reversed. Length, ¾—1; wings, 1½—2 lin.

Prof. Westwood discovered the ♀ in August, 1833, in Coombe Wood. Desvignes possessed a specimen which

is now in the National Collection; and I have another from the Forest Hills in Leicestershire.

2. *Strebloceru macroscapa*, Ruthe. (Pl. V., fig. 2 *b*).

Microctonus macroscapus, Ruthe, Stett. Zeit., 1856, p. 291, ♂.

Strebloceru macroscapa, Reinh., Berl. ent. Zeits., 1862, p. 327, pl. i., f. 11, a. ♀, b. head and antenna; S. v. Vol., Schets. Bracon., pl. iv., f. 4, ♀.

S. longiscapha, Westw., Tijdschr. v. Ent. 1881—82, p. 45, ♂, pl. viii., f. 9 (antenna ♂).

♀. Piceous, castaneous, or rufescent, metathorax and abdomen blackish; 3 basal joints of the antennæ rufous; face, mouth, and legs testaceous. Wings subhyaline, nervures and stigma pale; præbrachial nervure distinct. Antennæ 18-jointed; 1st joint very long, equal to the 10 following together; 2d obliquely inserted, forming a geniculation; 3d twice as long as the 4th; joints 3—6 filiform, the rest moniliform. Petiole of the 1st abdominal segment hardly longer than broad, striated; condylus much widened, conical. Terebra not quite half the length of the abdomen; valves black.

♂ slender; antennæ a little shorter than the body, not geniculated, 18-jointed; 1st joint longer than the 2d and 3d together. Otherwise like the ♀. Length, $\frac{3}{4}$—$1\frac{1}{2}$; wings, $1\frac{1}{2}$—3 lin.

As I have no specimen, the description is compiled from the authorities, not without a difficulty arising from certain discrepancies. Westwood gives the antennæ of the ♀ (from the Schetsen) as 17-jointed, and those of the ♂ as 16-jointed. He further mentions that the 1st joint in the ♂ is furnished with a small round tubercle near the base, and that the 3d joint is produced beneath into a deflexed spine at its apex; these characters are not represented in the figure by Van Vollenhoven, nor mentioned by Ruthe and Reinhard; so that it may be questioned whether the English description does not refer to a fresh species.

Ruthe possessed two males taken near Berlin, and Reinhard had a ♀, of which he has given a figure. Two English specimens of the ♂ are recorded by Westwood, one from Glanvilles Wootton, in Dale's collection, and the other preserved in that of Matthews, at Oxford.

v. Perilitus, *Nees.*

Perilitus, Nees, Act. Ac. L. C., 1819, p. 302 ; *Perilitus Sectio I.*, Nees, Mon., i., 29 ; Hal., Ent. Mag., iii., 34 ; Reinh., Berl. ent. Zeits., 1862, p. 323.
Microctonus and *Dinocamptus*, Först., Verh. pr. Rheinl., 1862, p. 251.

Antennæ straight, simple. Maxillary palpi 6-, labial 2—3-jointed. Fore wings with two cubital areolets, the 1st usually confused with the prædiscoidal, but sometimes distinct; radial areolet ending much before the apex of the wing, semicordate or sublanceolate; radius equally curved throughout, or somewhat straightened near the tip. Mesothoracic sutures distinct. Metathorax vertically or subvertically truncated and excavated behind. Terebra exserted.

Twenty European species are indicated in Reinhard's list (*l. c.*), many of which are very imperfectly described. Haliday established two sections, founded upon the presence or absence of the nervure dividing the 1st cubital areolet from the prædiscoidal. In six species the two areolets are separated, and Förster has made of them the genus *Dinocamptus* : they are not, however, otherwise distinguishable, and are not here treated as a separate genus. The sexes differ in appearance, and are paired with difficulty; the females have often a red head, and other parts of the body similarly coloured; the males are darker, with stouter and longer antennæ. The radial areolet is always small, ending not far from the middle point between the stigma and the apex of the wing; the radius forms either a regular parabolic curve (making the areolet semicordate), or it is somewhat straightened towards the end (making the areolet acute and sublanceolate). The radial areolet of the hind wing is petiolated, as in *Meteorus*. The metathorax is sometimes imperfectly areated.

The parasitism of one species (*P. terminatus*, Nees) was discovered in 1839 by Audouin (*Quelques observations sur le parasitisme des insectes* ; see Hagen, s. v. *Audouin*, no. 52) ; it is also recorded by Westwood (Int., ii., 143), Brullé (St. Farg. Hym., iv., 326), and Ratzeburg (Forstins, iii., 18). This insect attacks adult *Coccinellæ* of the species *septempunctata* and *quinquepunctata*, L. Audouin ascertained simply that a *Perilitus* emerged

from one of these beetles; but Ratzeburg has since made further observations of great interest (Ichn. d. Forst., iii., 61), showing that the parasite deposits its egg not in the larva but in the imago of the *Coccinella*. Three *Coccinellæ*, of the species above named, were watched by Ratzeburg, they having attached themselves to some plant and remaining motionless. After a short time there was found beneath the belly of each a grey, pyriform, somewhat transparent cocoon, beset with loose filaments, in which the legs of the beetles were entangled. From these cocoons emerged, between June 10th and 14th, three females of *P. terminatus*. Two of the *Coccinellæ* were by this time dead, but the third continued to linger. The parasitic maggots issued from the sutures of the ventral segments, which afterwards closed up, leaving no visible aperture. Dissection of one *Coccinella* showed the inside to be completely wasted, and the walls of the abdomen collapsed. On a second occasion Ratzeburg introduced a lively ♀ *Perilitus* into a glass-topped box containing a *Coccinella septempunctata*. The parasite immediately began to pay attention to the victim, moving about with great activity, and examining it on every side. Finally she assumed the characteristic attitude of an Ichneumon preparing to strike, by thrusting the abdomen forwards between the legs, so as to project beyond the head. The abdomen became greatly attenuated, and the terebra extended to its utmost length, supported and embraced by its valves as far as they could reach. Six to ten punctures were made in one minute, always directed towards the ventral sutures. In the course of an hour three or four such attacks were made upon the *Coccinella*, which seemed unconscious of any danger, and seldom winced. No danger however existed, for the *Perilitus* was not fecundated, and the whole proceeding was only a fruitless exhibition of an instinct.

Table of Species.

(6) 1. First cubital areolet separated from the præ-discoidal. *Dichori*, Hal., *Dinocampti*, Först.

(5) 2. Radial areolet ending nearer to the tip of the wing than to the stigma, sublanceolate. Terebra straight.

(4) 3. Abdomen of the ♀, after segment 1, testaceous. Petiole slender, only ⅓ of the width of the apex of the condylus .. 1. *rutilus*, Nees.

(3) 4. Abdomen of the ♀, after segment 1, nigropiceous. Petiole stouter, at least ½ as wide as the apex of the condylus .. 2. *strenuus*, n. s.

(2) 5. Radial areolet ending half-way between the tip of the wing and the stigma, semicordate. Terebra falcate .. .. .. 3. *falciger*, Ruthe.

(1) 6. First cubital areolet not separated from the prædiscoidal. *Synchori*, Hal., *Perilitus*, Först.

(12) 7. Labial palpi 3-jointed.

(9) 8. Radial areolet ending nearer to the tip of the wing than to the stigma .. .. 4. *brevicollis*, Hal.

(8) 9. Radial areolet ending half-way between the tip of the wing and the stigma, or nearer to the stigma.

(11) 10. Thorax more or less, and 1st abdominal segment, rufo-testaceous .. .. .. 5. *bicolor*, Wesm.

(10) 11. Thorax and 1st abdominal segment entirely black .. .. 6. *secalis*, Hal.

(7) 12. Labial palpi 2-jointed.

(14) 13. Metathorax areated; wings hyaline; ♂ black; head of the ♀ testaceous; terebra ½ as long as the abdomen.. .. .. 7. *cerealium*, Hal.

(13) 14. Metathorax not areated, rugoso-reticulate; wings whitish; ♂ ♀ black, the ♀ with rufous orbits; terebra ¼ as long as the abdomen .. .. 8. *æthiops*, Nees.

1. *Perilitus rutilus*, Nees. (Pl. V., fig. 5).

Bracon rutilus, Nees, Mag. Ges. Berl., 1811, p. 27, ♀.
Perilitus rutilus, Nees, Mon., i., 31, ♀; Hal., Ent. Mag., iii., 34, ♂ ♀.
Microctonus rutilus, Wesm., Nouv. Mém. Ax. Brux., 1835, p. 68, ♂ ♀, pl. i. (wing); Ruthe, Stett. Zeit., 1856, p. 299, ♀.
Perilitus ruralis ♂, and *luteus* ♀, Schäff., F. G., clvi.

♀. Black; head, antennæ at the base, abdomen after the 1st segment, basal half of the petiole, and the legs, testaceous; segment 2 often castaneous; tarsi fuscous. ♂. Black; face and orbits testaceous; hind coxæ fuscous; abdomen darker than that of the ♀, fuscous at the apex. Wings subhyaline, stigma lutescent, nervures and squamulæ pale fuscous; radial areolet elongate-sublanceolate, ending just beyond the middle point between the stigma and the apex of the wing. Terebra straight, as long as ¾ of the abdomen. Length, $1\frac{1}{3}$—$1\frac{3}{4}$; wings, $2\frac{3}{4}$—$3\frac{1}{4}$ lin.

Var. ♀. Head, mesothorax, and abdomen entirely testaceous; antennæ 25-jointed. Nervure dividing the 1st cubital areolet from the prædiscoidal extremely faint. An old specimen in Fitch's collection. Somewhat doubtful, but placed here provisionally.

Antennæ ♀ as long as the body, filiform, 25—26-jointed, black, with the 1st joint testaceous. Stemmaticum fuscous. Nervure dividing the 1st cubital and prædiscoidal areolets weak and subinterrupted; cubital nervure subobsolete. Thorax black; mesothoracic sutures converging into a punctate depression. Scutellum smooth, preceded by a transverse fovea much shorter than itself. Metathorax punctato-rugulose, not areated, truncated, and with an oblong excavation behind. First abdominal segment slender, tuberculated in the middle, at the apex three times wider than the petiole, finely striated longitudinally; black, the petiole pale at the base; the rest of the abdomen oblong-ovate. Antennæ of the ♂ stouter, longer than the body, 28—29-jointed, the 1st joint black; in one ♂ the antennæ are only 23-jointed.

Described from two females, four males. Rather common throughout the country. I have repeatedly found the ♀, and in 1885 captured both sexes in a wood at Nunton. Capron has taken six females at Shiere.

2. *Perilitus strenuus*, n. s.

Niger, antennarum radicula, ore, orbitis, rufo-testaceis, vel orbitis interdum nigris. Pedes 4 anteriores testacei; femora intermedia basi fusca; postici picei vel fusco-testacei tibiis apicem versus obscurioribus; tarsi omnes nigri. Abdominis segmenta 2—3 picea. Alæ fere hyalinæ, stigmate, nervis, squamulis, pallide fuscis; areola radialis longior et latior quam in specie præcedente. Scutellum læve, fovea ante basin transversa, breviore quam ipsum, instructum. Petiolus in longitudinem striolatus, utriusque sexus latior quam in *P. rutilo*; feminæ duplo latior quam maris. Terebra dimidia abdominis longitudine.

Black; radicle of the antennæ, mouth, orbits, and cheeks, rufo-testaceous; or the orbits concolorous. Four anterior legs testaceous; middle femora fuscous at the base; hind legs piceous or fusco-testaceous, their tibiæ darker towards the tips; all the tarsi black. Abdominal segments 2—3 piceous. Wings nearly hyaline, stigma, nervures, and squamulæ pale fuscous; radial areolet longer and broader than in the preceding species. Scutellum smooth, preceded by a transverse fovea much shorter than itself. Petiole longitudinally striolated, in both sexes broader than that of *rutilus*;

that of the ♀ twice as broad as that of the ♂. Terebra half as long the abdomen. Length, 1½; wings, 3 lin.

Antennæ ♀ 23-jointed; of the ♂ 28—29-jointed, stout, longer than the body. Mesothoracic sutures converging into a rugulose depression. Scutellum smooth, shining, with a few lateral punctures. Metathorax short, abruptly truncated, rugulose; two medial carinæ, more or less distinct, originate from its base, and are parallel as far as the truncation, where they diverge on each side of the posterior concavity. First abdominal segment entirely black and striolated, twice as broad at the apex as it is at the base, and much broader in the ♀ than in the ♂; tubercles medial. Very distinct from *rutilus*; larger and more robust; metathorax and 1st abdominal segment differently formed; radial areolet more elongate; neuration stronger; legs of both sexes, and abdomen of the ♀, differently coloured; the characters of the ♀ have been given to me by Capron. *P. terminatus*, Nees, stands nearest to this species, but differs in having a rugulose scutellum. The radial areolet is much longer than in *falciger*.

I captured two males in 1885; one in the same wood with *P. rutilus*, the other in the Isle of Wight. Capron has taken at Shiere six more males and the only female.

3. *Perilitus falciger*, Ruthe.

Microctonus falciger, Ruthe, Stett. Zeit., 1856, p. 300, ♂ ♀.

? Perilitus peregrinus, Schäff., F. G., clvi.

♀. Black; head concolorous, mandibles rufous; femora and tibiæ piceo-rufous, coxæ black, tarsi tipped with fuscous; base of the petiole pale testaceous. Wings subhyaline, nervures, stigma, and squamulæ fusco-testaceous; radial areolet shorter than in the two preceding species, semicordate, ending half-way between the stigma and the tip of the wing. Abdomen truncated posteriorly. Terebra as long as ½ the abdomen, its apical half decurved, falcate. The ♂ is similar, but the petiole is black at the base. Length, 1¼—1⅔; wings, 2½—3¼ lin.

Var. ♀. Antennæ at the base, face, and cheeks, rufescent; mouth and legs rufo-testaceous; hind coxæ black. Ruthe.

Antennæ ♀ filiform, not longer than the body, 22—24-jointed; those of the ♂ longer, setaceous, 28-jointed, paler at the base underneath. Form slender. Mesothorax as in the other species. Ante-scutellar fovea much shorter than the scutellum, which is smooth and shining. Metathorax short, rugulose, not quite

vertically truncated, slightly excavated behind. First abdominal segment striolated; petiole about half as broad as the apex of the condylus; tubercles medial, salient.

I have only a ♀ specimen, taken in Northamptonshire, which is very distinct owing to the form of the terebra; the legs are coloured as in Ruthe's variety. The dividing nervure between the 1st cubital and præ-discoidal areolets is so faint as to be discerned with difficulty. A specimen exists in the British Museum, ticketed in the handwriting of F. Smith, "the larva from a living *Timarcha coriaria*," F.

4. *Perilitus brevicollis*, Hal.

Perilitus brevicollis, Hal., Ent. Mag., iii., 35, ♀.
Microctonus retusus, Ruthe, Stett. Zeit., 1856, p. 298, ♀.

♀. Black; head, antennæ at the base, and fore legs, rufo-testaceous; 4 posterior legs piceo-fulvous, their tibiæ darker at the tips; hind coxæ fuscous; tarsi blackish; occiput, together with the middle of the front and of the vertex, fuscous; abdomen pitchy-black; base of the 1st segment pale. Wings subhyaline, nervures and stigma fuscous; radial areolet ovate-lanceolate, ending rather nearer to the tip of the wing than to the stigma. Labial palpi 3-jointed. Terebra curved, somewhat less than half the length of the abdomen. ♂ unknown. Length, $1\frac{3}{4}$; wings, $3\frac{1}{4}$ lin.

Stouter than *P. cerealium* (sp. 7), and twice as large; easily distinguished by its whole structure. Antennæ 26-jointed, hardly shorter than the body, the 1st joint rufescent. Orbits, face, and mouth rufous. Maxillary palpi with the apical joints not remarkably shorter than the preceding; joints of the labial palpi subequal in length. Mesothoracic sutures ending in a wide thickly punctate depression, in the middle of which is a distinct longitudinal line; posterior angles near the base of the scutellum gibbous. Metathorax very short, vertically truncate, rugose, reticulated. First abdominal segment elevated posteriorly, much stouter than in the other species, obconic, rugulose, the apical angles longitudinally striated; tubercles medial. Valves of the terebra fusco-ferruginous.

Unknown to me; only two examples seem to have occurred (one in North Ireland, taken by Haliday, the other in Germany by Ruthe) until Capron discovered three females at Shiere.

5. *Perilitus bicolor*, Wesm.

Perilitus conterminus, Hal., Ent. Mag., iii., 36, ♂; Schäff., F. G., clvi. (not of Nees).
P. secalis, var. γ, Hal., *l. c.*, ♀.
Microctonus bicolor, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 61, ♂; Ruthe, Stett. Zeit., 1856, p. 294, ♂ ♀ (not of Ratz.).
Leiophron basalis, Cur., B. E., 476, 6*a*, ♂.

Variable, rufescent, face, mouth, and legs rufo-testaceous; thorax above, and abdomen after the 1st segment, black; antennæ fuscous, rufo-testaceous at the base. Wings subhyaline, stigma and nervures lutescent or pale fuscous; radial areolet sublanceolate, acute, ending nearer to the stigma than to the apex of the wing. Labial palpi 3-jointed. Terebra straight, as long as half the abdomen. ♂ ♀. Length, ¾—1¼; wings, 1½—2½ lin.

Head and thorax more or less rufous, piceous, or black; abdomen black or piceous, the 1st segment at least generally rufo-testaceous; in one ♀, however, this is also blackish. The smaller individuals are the males. Palpi, according to Haliday, nearly as in *secalis* (sp. 6), but the 1st joint of the maxillary is less abbreviated, the 2d and 3d increasing in length. Antennæ shorter than the body, those of the ♀ 18-, of the ♂ 20—21-jointed; but in one ♀ they are 24-jointed. Mesothoracic sutures impunctate, ending in a small aciculated space before the scutellum. Metathorax areated, sublævigated, not sensibly excavated behind, short, almost vertically truncated. First abdominal segment striolated; petiole slender; tubercles salient just behind the middle; condylus twice as broad as the petiole, its sides almost parallel; hinder part of the abdomen ovate-orbiculate. The ♀ with 24-jointed antennæ is not otherwise different, and certainly belongs to this species.

The colour of the abdomen, black posteriorly, and having the 1st segment rufous, is an obvious distinctive character. *P. secalis* has also 3-jointed labial palpi, but the tubercles are less conspicuous, and the abdomen is not rufous at the base. Haliday saw in the present species the *P. conterminus*, Nees, referring only to the ♂ with 21- (*i. e.*, 20-) jointed antennæ. The ♀, according to Nees, has 24- (*i. e.*, 23-) jointed antennæ, and may be rightly paired with his ♂, notwithstanding Wesmael's just remark that the antennæ of the ♀ ought to have fewer joints than those of the ♂. The difficulty, as regards *conterminus*, consists in the remark of Nees that

the antennæ are scarcely half as long as the body, and that the *petiole only* of the abdomen, in the ♂, is black. His omission of other characters renders the description for ever doubtful, and *conterminus* must be abandoned.

Described from five males, four females, taken in the Isle of Wight; at Milford Haven; at St. Albans; at Nunton, Wilts; at Honor Oak (by Billups); in the Pyrenees; and from Walker's collection. Found several times by Haliday in North Ireland, in autumn. Wesmael possessed five males captured near Brussels, and Ruthe's collection contains fifteen males and seven females.

6. *Perilitus secalis*, Hal.

Perilitus secalis, Hal., Ent. Mag., iii., 36, ♀; not his var. γ; and not *Ichneumon secalis*, Lin., F. S., 1641.

Microctonus spurius, Ruthe, Stett. Zeit., 1856, pp. 297 and 307 (Nachtrag), ♀.

M. æthiops, var. 2, Wesm., Nouv. Mém. Ac. Brux., 1838, p. 143, ♀.

M. bicolor, Ratz., Ichn. d. Forst., ii., 57, ♀, pl. ii., f. 26 (wing); not of Wesm.

Labial palpi 3-jointed. Black; antennæ at the base, head, prothorax beneath, and legs, rufo-testaceous; hind coxæ, with their trochanters, and all the tarsi at the apex, fuscous; some of the abdominal segments after the 1st often piceous, and the apical segments testaceous. Wings hyaline, nervures and stigma fusco-testaceous, squamulæ dull yellowish; stigma widely ovate, lanceolate, broader than that of *æthiops* (sp. 8); radial areolet semicordate, ending a little nearer to the stigma than to the tip of the wing. Terebra straight, as long as half the abdomen. ♀. Length, $1\frac{1}{4}$—$1\frac{1}{2}$; wings, $2\frac{3}{4}$—$3\frac{1}{4}$.

Male unknown. Variable; head sometimes black, leaving only the mouth and orbits rufous; thorax and 1st abdominal segment generally black, the following segments piceous, becoming paler towards the anus, or entirely black or piceous; hind coxæ sometimes testaceous. First joint of the maxillary palpi very short, 3d longer and stouter than the 2d; 4th longer than the 3d; 6th shorter than the 4th, but rather longer than the 5th. Labial palpi with one more joint than those of the two following species; 1st joint obconic, 2d and 3d shorter, ovate. Antennæ 21—25-jointed, filiform, hardly shorter than the body, dull rufous at the base. Metathorax punctato-rugulose, carinulated, vertically truncated, and with an oblong

posterior impression. Segment 1 as in the preceding species, but black at the base, and with less prominent tubercles; longitudinally striolated. Valves of the terebra filiform, black, paler at the base.

This species is distinguished with difficulty from the ♀ of *æthiops*, and perhaps only by the labial palpi, which have been observed under the microscope by Haliday and Reinhard. My specimens are old and useless, and have not been employed in this description. Fresh examples are required for determination, and a note of the palpi should be taken while they are pliant; otherwise the destruction of the insects may be necessary in order to verify them. It may be noticed, however, that in *secalis* the metathorax is somewhat shining, with scattered punctures, and the squamulæ dull stramineous; while in *æthiops* the metathorax is rugoso-reticulate, and the squamulæ fuscous. Ruthe supposed his *M. spurius* to be a variety of *æthiops*, but Reinhard has determined its identity with *secalis*. Haliday believed the *Ichneumon secalis*, L., to be the present insect. In the Linnean collection is a ♀ ticketed "*secalis, agricolator*"; and another in bad condition, placed apart, and unlabelled. Fitch has visited these specimens, which have a large yellow head and long terebra; the wings are not easily seen, but the insects are undoubtedly *Cenocœlius rubriceps*, Ratz. *P. secalis* is the species described by Ratzeburg (*l. c.*) as sent to him by Hartig, and conjectured erroneously to be a parasite of *Lasiocampa pini*, L.

7. *Perilitus cerealium*, Hal.

Perilitus cerealium, Hal., Ent. Mag., iii., 37, ♂ ♀.
Microctonus æmulus, Ruthe, Stett. Zeit., 1856, p. 293, ♂ ♀.
P. rufipes, Schäff., F. G., clvi.

Labial palpi 2-jointed. ♂ black; antennæ at the base, mouth, and clypeus, dull testaceous; orbits broadly rufous; legs rufo-testaceous, hind coxæ fuscous above. ♀ black; antennæ at the base, head, and legs, rufo-testaceous; abdomen piceous, its apex obscurely rufous. Wings narrower than in *secalis*, subhyaline, nervures and stigma fusco-testaceous, squamulæ dull yellowish; stigma broadly ovate, lanceolate; radial areolet semicordate, ending somewhat nearer to the stigma than to the tip of the wing.

Terebra decurved, as long as half the abdomen. Length, 1—1½; wings, 2—3 lin.

The rufous head of the ♀ has the stemmaticum, and sometimes the margin of the occiput, fuscous. Thorax and 1st abdominal segment black. Maxillary palpi short, 1st joint hardly distinct, 2d longer than the 3d, 5th and 6th closely conjoined, together not longer than the 4th, 6th conical, attenuated. Antennæ 20—23-jointed, a little shorter than the body, filiform, the 1st joint rufous beneath. Metathorax short, areated. Abdomen compressed, and truncated at the apex; segment 1 forming about ½ of its length, regularly striolated; tubercles distinct; sides of the condylus subparallel. In the ♂ the antennæ are longer than the body, the abdomen ovate, and the colours darker.

Distinguished from *secalis* by the labial palpi; from *æthiops* by its more slender form, by the areated metathorax, by the more strongly curved radius, by the shorter radial areolet, and the decurved terebra. Very like *falciger* ♀ (sp. 3), but in that species the 1st cubital areolet is separated from the prædiscoidal.

Not uncommon throughout the country, although I have no specimen. Billups has taken the ♀ at Peckham.

8. *Perilitus æthiops*, Nees.

Perilitus æthiops, Nees, Mon., i., 32, ♂; Hal., Ent. Mag., iii., 37, ♂ ♀; Schäff., F. G., clvi., f. 16.
Microctonus æthiops, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 57, ♂ ♀, pl. i. (wing); Ruthe, Stett. Zeit., 1856, p. 292, ♂ ♀.

Labial palpi 2-jointed. ♂ black; legs often piceous; femora at the apex and tibiæ at the base rufous; or fore femora, or all the femora, dull rufous, black at the base. ♀ black; face, mouth, cheeks, orbits, and base of the antennæ, dull rufous; or head entirely rufo-testaceous; legs rufous, hind coxæ black, tarsi fuscous. Wings whitish hyaline; stigma, nervures, and squamulæ fuscous; stigma narrower than that of *secalis*; radial areolet semicordate, ending a little nearer to the stigma than to the apex of the wing. Length, 1—1½; wings, 2¼—3¼ lin.

Var. ♂. One-half or one-third smaller; antennæ 24—25-jointed. This may possibly be the unknown ♂ of *P. secalis*.

Antennæ of the ♂ ⅓ longer than the body, 27—30-jointed. First joint of the maxillary palpi short but distinct, 5th and 6th together ⅓ longer than the 4th, 6th attenuated at the apex. Abdomen ovate-lanceolate; segment 1 much more slender than that of the ♀.

♀. Very like *secalis*. Antennæ hardly shorter than the body, 25—26-jointed. Metathorax thickly rugulose and reticulated. First abdominal segment broader than in *secalis*, longitudinally striolated; tubercles very prominent; condylus oblong, and slightly widened at the apex.

The sixteen males described by Wesmael, with 22—28-jointed antennæ, are probably not all of the same species; his three females with 23-jointed antennæ appear also doubtful. The same must be said of Ruthe's three varieties, differing structurally in the neuration, and his males, which were only two-thirds of a line long.

Described from six males, one female. Common. Found by Haliday on sandy coasts, the ♀ once only, the ♂ more frequently. Capron has taken four females and many more males at Shiere.

vi. Microctonus, *Wesm.*

Wesm., Nouv. Mém. Ac. Brux., 1835, p. 54; Reinh., Berl. ent. Zeits., 1862, p. 321.

Antennæ filiform. Maxillary palpi 6-, labial 3-jointed. Fore wings with two cubital areolets, the 1st not separated from the prædiscoidal; radial areolet cultrate, elongate, extending nearly to the apex of the wing; radius straight, or nearly so. Mesothoracic sutures almost always effaced. Terebra exserted or subexserted.

The species are few in number, smooth and shining, testaceous and black in different proportions. They stand nearer to *Meteorus* than the other *Euphorides*, having a similar radial areolet, and the same number of joints in the palpi. The abdomen is usually ovate, lanceolate; in one species clavate, compressed, and obtuse; the 1st segment is nearly as long as the rest of the abdomen, widened gradually from the base to the apex, and having the tubercles beyond the middle. Suturiform articulation obsolete. Radius of the fore wings seldom very slightly curved, in which case it ends somewhat further from the extremity of the wing. Metathorax smooth, or obsoletely areated, more or less truncated and excavated posteriorly. The wings are very like those of *Leiophron* and *Blacus*, but in both those genera the 1st cubital areolet is distinct from the prædiscoidal. Nees and Haliday were acquainted with one species, Wesmael with two, and Ruthe with six; of

the five here introduced, all except the first are new discoveries. Their earlier states have not yet been observed.

Table of Species.

(2) 1. Præbrachial nervure of the fore wings obsolete. Length, $1\frac{1}{4}$ lin. .. .. .. 1. *vernalis*, Wesm.

(1) 2. Præbrachial nervure of the fore wings distinct. Length, $1\frac{1}{2}$—2 lin.

(4) 3. First abdominal segment aciculated .. 2. *splendidus*, n. s.

(3) 4. First abdominal segment smooth.

(6) 5. Antennæ ♀ 28-jointed (♂ unknown), but its antennæ cannot have fewer than 28 joints .. .. 3. *xanthocephalus*, n.s.

(5) 6. Antennæ ♂ ♀ with fewer than 28 joints.

(8) 7. Antennæ ♂ ♀ 19-jointed .. .. .. 4. *testaceus*, n. s.

(7) 8. Antennæ ♂ 26-, ♀ 22—23-jointed .. 5. *cultus*, n. s.

1. *Microctonus vernalis*, Wesm.

Microctonus vernalis, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 56, pl. i. (wing); *lib. cit.*, 1838, p. 142 (var. 2, ♂); Ruthe, Stett. Zeit., 1856, p. 289; Reinh., Berl. ent. Zeits., 1862, p. 322, ♂ ♀.

Perilitus idalius, Hal., Ent. Mag., iii., 1835, p. 38, ♀.

Microctonus politus, Ruthe, *lib. cit.*, p. 290, ♂.

Testaceous, variable; antennæ after the 4th or 5th joint fuscous; head, thorax, and abdomen in various degrees infuscated or blackish above; apical joint of the tarsi and valves of the terebra fuscous. Wings hyaline, nervures and stigma pale testaceous; præbrachial nervure obsolete. Abdomen ♀ compressed; segment 1 scarcely widened behind, sublinear, as long as 2, which is somewhat longer than all the remaining segments together. Terebra as long as $\frac{1}{3}$ of the abdomen. ♂ ♀. Length, 1—$1\frac{1}{4}$; wings, 2—$2\frac{1}{2}$ lin.

Var. α. Fusco-testaceous, the pleuræ pale; hind coxæ infuscated. ♂ (*M. politus*, Ruthe).

Var. β. First abdominal segment black. ♀.

Var. γ. Thorax almost entirely black. ♂ (Wesm., Suppl., p. 142).

Variable in colour, the ♂ darker than the ♀; the parts liable to be infuscated are the vertex, stemmaticum, disk of the mesothorax (in spots corresponding to the 3 lobes), scutellum, metathorax, and abdomen above, especially at the apex. The smallest British species. Eyes green. Antennæ shorter than the body, filiform, those of the ♂ 23—25-, of the ♀ 18—21-jointed. Body smooth and shining. Mesothoracic sutures effaced. Metathorax short,

its posterior declivity not vertical; concave behind, and there faintly rugulose, with a fine medial line forming 2 lateral polished areæ. First abdominal segment shorter than in the following species, and not wider posteriorly, smooth and shining except some slight transverse scratches towards the apex; tubercles inconspicuous. The rest of the abdomen, viewed from above, appears sublinear; viewed laterally, ovate; belly compressed and cariniform.

Not common; I have seen no specimens but my own, two females, taken respectively at St. Albans, and at Nunton, Wilts. Wesmael possessed two males, one female, taken near Brussels in May, and two males of var. γ; S. van Vollenhoven notices one found at the Hague, and others have been captured in Germany.

2. *Microctonus splendidus*, n. s.

♂. Ater, splendidus, antennarum articulis 2 basalibus, palpis, pedibusque, testaceis; coxis posticis fuscescentibus; genis, cum capite infra et postice, rufo-testaceis. Alæ hyalinæ, flavescentes, stigmate, nervis, squamulis, pallide testaceis; nervo præbrachiali distincto; areola radiali quam in *M. culto* paulo breviore; radio perparum curvato. Mesothoracis sulculi nulli. Metathorax curtus, postice fere in perpendiculum truncatus, et ibidem excavatus, carina areisque nullis. Segmentum 1um aciculatum v. striolatum, nitidum, abdominis triente longius, tuberculis pone medium conspicuis, condylo exinde ad apicem paulo latiore. Abdomen cæterum, desuper inspicienti, elongatum, ovatum; a latere visum clavatum; apice oblique truncatum, forcipis masculi valvis compressis, breviter exstantibus, supra quas apparet penis vagina. Femina hucusque latet.

Shining black; palpi, legs, and joints 1—2 of the antennæ testaceous; hind coxæ somewhat infuscated; cheeks and hinder part of the head beneath rufo-testaceous. Wings hyaline, with a yellowish tinge, nervures, stigma, and squamulæ pale testaceous; præbrachial nervure distinct; radial areolet rather shorter than in sp. 5; radius very slightly curved. Mesothoracic sutures effaced. Metathorax short, almost vertically truncated behind, and there excavated, without medial carina or areæ. First segment longer than $\frac{1}{3}$ of the abdomen, stouter than in sp. 5, tuberculated behind the middle, after which the condylus is wider to the apex; the segment is minutely striolated or aciculated, but shining. The rest of the abdomen, viewed from above, is elongate-ovate; viewed

laterally, clavate; obliquely truncated at the apex, within which are seen the short flattened valves of the anal forceps, and above them the sheath of the sexual organ. Female unknown. Length, $1\frac{1}{3}$; wings, $2\frac{3}{4}$ lin.

Antennæ as long as the head, thorax, and 1st segment, stout, filiform, 19-jointed. Head transverso-cubic, somewhat buccate and wider than the thorax. The dilated cheeks and under side of the head, together with the 1st abdominal suture, are rufous; the rest of the body intensely black and shining.

M. Klugii, Ruthe (Stett. Zeit., 1856, p. 290) corresponds to this insect in many respects, but the frons and mesothorax are punctato-rugulose; the antennæ of both sexes, according to Reinhard, are also 22-jointed, and scarcely as long as the head and thorax.

Described from two males taken in a wood near my house at Nunton, Wilts.

3. *Microctonus xanthocephalus*, n. s.

♀. Aterrimus, politus, capite antennarum scapo pedibusque testaceis, stemmatico fusco. Tarsi omnes apice nigricantes. Alæ subfumato-hyalinæ, squamulis stramineis, stigmate testaceo undique fusco cincto, nervis fuscis. Abdomen compressum segmento 1o sublineari postice vix latiore, tuberculis parum conspicuis, terebra breviter exserta, falcata, decurva.

Very black, smooth and shining; head, scape of the antennæ, and legs, testaceous; stemmaticum fuscous; last joint of all the tarsi blackish. Wings dull hyaline, squamulæ stramineous, stigma testaceous bordered all round with fuscous, nervures fuscous. Abdomen compressed, 1st segment sublinear, hardly widened posteriorly; tubercles inconspicuous; terebra short, falcate, decurved. Length, 2; wings, $3\frac{3}{5}$ lin.

Antennæ filiform, shorter than the body, 28-jointed. Mesothoracic sutures effaced. Metathorax short, triangularly excavated behind. Hind coxæ with a piceous basal spot. First abdominal segment occupying more than $\frac{1}{3}$ of the whole length, linear and depressed as far as the tubercles, condylus convex and very slightly widened; segments 2—3 extending nearly to the apex, the rest retracted, annuliform. Abdomen after the 1st segment narrowly elliptical, as viewed from above, as long as the head and thorax; viewed laterally, clavate.

Differs from all other British species in coloration, superior size, and greater number of joints in the antennæ.

Discovered at Shiere, near Guildford, by Capron, and described from his unique specimen.

4. *Microctonus testaceus*, Capron, n. s.

Rufo-testaceus, antennis (præter articulos 2 basales), stemmatico, mesothoracis lineis, abdominisque segmento 1o, nigris. Alæ subinfumatæ, nervis ad basin fuscis, extus pallidioribus, squamulis testaceis, stigmate flavo; areola radialis procul ab alæ apice clausa, stigmate paulo longior. Abdomen lævc, splendidum, clavatum; segmentum 1um trientem fere ejus occupans, solito angustius, apice duplo latius quam basi, tuberculis prominulis, vix nisi mediis. Terebra abdominis trientem paulo superans.

Rufo-testaceous; antennæ (except the 2 basal joints), stemmaticum, three lines on the mesothorax, and 1st abdominal segment, black. Wings slightly infumated; nervures fuscous at the base, paler towards the apex of the wing; squamulæ testaceous; stigma yellow; radial areolet ending much before the tip of the wing, a little longer than the stigma. Abdomen smooth, shining, clavate; 1st segment forming about $\frac{1}{3}$ of its entire length, rather narrow, about twice as broad at the apex as at the base; tubercles prominent, situated nearly in the middle. Terebra a little more than $\frac{1}{3}$ of the length of the abdomen. ♂ ♀. Length, 2; wings, $3\frac{1}{2}$ lin.

Head transverse, not contracted behind the eyes, the sides almost parallel. Antennæ about $\frac{1}{2}$ as long as the body, black, with the first two joints yellow, 19-jointed in both sexes. Mesothorax very smooth, marked with 3 black lines, whereof the middle one is abbreviated posteriorly. Metathorax faintly divided into 5 areæ; in one example it is also blackish. In the male the head and whole body are black; the legs only and first two joints of the antennæ being rufo-testaceous.

Four males and one female have been taken by Capron at Shiere, near Guildford; the above description has been kindly prepared by him. *M. elegans*, Ruthe (Stett. Zeit., 1856, p. 290), of which I have specimens from Hungary, is not unlike this species, but, beside minor differences, the antennæ are 30-jointed even in the ♀.

5. *Microctonus cultus*, n. s.

♀. Rufo-piceus v. piceo-testaceus, oculis, faciei occipitisque lituris, stemmatico, scutello, metathorace, abdominisque segmento 1o, nigris aut nigricantibus; segmentis 2—3 saturate rufo-piceis, cæteris pallide rufis. Antennæ fuscæ, articulis 1—5 pallide testaceis. Pedes pallide testacei. Alæ hyalinæ, nervis, stigmate,

pallide testaceis; nervus præbrachialis distinctus. Mesothoracis sulculi haud penitus obliterati. Metathorax brevis, postice truncatus, ibidem excavatus, medio carinulatus. Segmentum 1um totius abdominis triente longius, a basi inde ad apicem perpaulo ampliatum, tuberculis inconspicuis. Terebra abdominis quintam partem adæquans.

♂ aliter coloratus; niger, prothorace, antennarum scapo, ventris basi, testaceis; mesothoracis disco, scutello, abdominis segmento 2o, saturate rufo-piceis; coxis posticis infuscatis.

♀. Rufo-piceous or picco-testaceous; eyes, a blotch on the face and on the occiput, stemmaticum, scutellum, metathorax, and 1st abdomidal segment, black or blackish; segments 2—3 dark rufo-piceous, the rest pale rufous. Antennæ fuscous, joints 1—5, together with the legs, pale testaceous. Wings hyaline, nervures and stigma pale testaceous; præbrachial nervure distinct. Mesothoracic sutures not wholly effaced. Metathorax short, truncated and excavated behind, carinated in the middle. First segment longer than ⅓ of the abdomen, very slightly widened from the base to the apex; tubercles inconspicuous. Terebra as long as ⅓ of the abdomen.

The ♂ is black, with the prothorax, scape of the antennæ, and belly at the base, testaceous; disk of the mesothorax, scutellum, and 2d abdominal segment dark rufo-piceous; hind coxæ infuscated. Length, 1½; wings, 3 lin.

Var. ♀. Head pale rufo-testaceous, only the eyes and stemmaticum black.

Antennæ ♂ as long as the body, 26-jointed; of the ♀ shorter, 22—23-jointed. Entirely smooth and shining. Mesothoracic sutures indicated by two shallow grooves in front, which are evanescent before reaching the scutellum. The medial carina of the metathorax bifurcates at the declivity, its two branches surrounding the posterior concavity and forming 3 areæ, whereof the 2 lateral are smoother and more shining than the posterior. Terebra testaceous, with black valves. The variety, owing to its rufous head, resembles a *Dinocamptus*.

Described from three males, three females, taken in a wood near Barnstaple, a male from St. Albans, and another in Fitch's collection. Capron has taken five females and one male at Shiere.

XV. METEORIDES.

The characters are comprised in those of the single genus.

Meteorus, *Hal.*

Meteorus, Hal., Ent. Mag., iii., 24.
Perilitus, Sectio II., Nees, Mon., i., 33.
Perilitus, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 21.

Maxillary palpi 6-, labial 3-jointed. Occiput margined. Antennæ slender, usually filiform in the ♀, setaceous in the ♂. Meso-thoracic sutures distinct. Abdomen petiolated. Fore wings with 3 cubital areolets, the 2d trapeziform, the 1st separated from the prædiscoidal; radial areolet cultrate, reaching nearly to the apex of the wing; radius straight; metacarpus longer than the stigma. Terebra exserted.

Head as broad as the thorax, or broader; occiput hardly emarginate behind; eyes small, and scantily pubescent; clypeus rounded anteriorly, separated from the face by an impressed line with a fovea at each end; mandibles forcipate, bidentate. Abdomen ovate or lanceolate, compressed at the apex in the ♀; segment 1 consisting of a true petiole (as in the *Ichneumonidæ*), linear, and extending to the spiracular tubercles situated near the middle; the posterior part (condylus) is gradually dilated to the apex; usually this segment is striolated, but the petiole is sometimes smooth. In the majority of cases the 1st segment presents at the apex of the petiole a pair of oblong parallel apertures, separated by a ridge, and descending obliquely to the spiracles; in the following descriptions these are called the *tracheal grooves*. The remaining segments are always smooth and shining; segments 2—3 are connate, longer and broader than the following, which decrease rapidly to the anus. Second cubital areolet trapeziform, more or less narrowed towards the radius, its lower and inner angle produced præbrachial areolet generally shorter than the pobrachial, rarely equal to it, and only in one species longer; recurrent nervure commonly somewhat rejected, occasionally interstitial, and more rarely evected; radial areolet of the hind wings divided by a transverse accessory nervure in two species, and the same structure faintly indicated in others; wings hyaline, but in three species infumated, and then exhibiting a whitish streak upon the ordinary transverse fold, which commences under the stigma. The wings have a strong disposition to bend at this place, which produces illusions as to the direction of the recurrent nervure. The integuments of these insects are thin, and the colours inconstant; a

permanently testaceous variety appears to exist in some of the species.

The *Meteori* are nearly related to the preceding group, but present a more advanced structure; transitional forms may be looked for among exotic species, and one such has been mentioned in the note on *Wesmaelia* (*Euphorides*, genus vi., *ante*). Some of them are among our larger Braconids, and their petiolated abdomen and exserted terebra give them much the appearance of certain *Ichneumonidæ*, e. g., *Mesochorus*, a genus which furnishes some of their hyperparasites. The large testaceous *Meteori* have also a strong resemblance to the insects of the genus *Ophion* or *Paniscus*. Some attention is required to distinguish them from the three species of *Zele* hereafter to be described among the *Macrocentrides*: the best distinction lies in the 1st abdominal segment, which, although very slender in the genus *Zele*, is not petiolated, having the spiracular tubercles close to the base.

Few of the insects of this genus are mentioned by the older authors: DeGeer, in 1771, noticed pensile cocoons, which were white, in the neighbourhood of the nests of *Bombyx processionea*, L. (Mém., ii., xi., p. 449): Latreille, Spinola, and Nees von Esenbeck in his earlier writings did not distinguish them from *Ichneumon* and *Bracon*. The last-named writer, in 1834, effected their separation as a section of his *Perilitus*, and brought together in his monograph 13 species, of which 12 are genuine. Haliday, in 1835, with the assistance of Curtis, described 17 British species, and in the same year 23 Belgian species were published by Wesmael. The latest and most important work upon the subject is a posthumous paper by Ruthe, published by Reinhard in the Berl. ent. Zeits. for 1862 (pp. 1—58), containing 37 species, and preceded by a synoptical table. A few species may also be found in the work of Ratzeburg.

It has already been shown that *Perilitus*, Sectio II., of Nees may with equal propriety be called *Meteorus* or *Perilitus*; but the preponderance of usage appears to be in favour of *Meteorus*; the name is sanctioned by Haliday, Blanchard, Brullé, and Reinhard, and refers appropriately by its meaning to the pensile cocoons made by many of the larvæ. *Zele* of Curtis (B. E., 415), if duly authenticated, would be the earliest name, but, while

the illustration in the 'British Entomology' applies to the present genus, the type adduced (*Z. testaceator*, Cur.) belongs to the *Macrocentrides*, and *Zele* has been placed in that group, with the required correction, by Haliday. *Zemiotes* and *Protelus* are genera proposed by Förster (Verh. d. pr. Rheinl., 1862, p. 253) for two species of *Meteorus*, but I have found it impossible to adopt them here. The only differential character assigned to *Zemiotes* is the partition of the radial areolet of the hind wings by a transverse nervure, as in *M. albiditarsis*, Cur. But this character includes *M. caligatus*, Hal., which in other respects differs widely, while it excludes three other large species which are closely allied. *Protelus* was devised in order to isolate *M. chrysophthalmus*, Nees, on the ground that the præbrachial areolet of the fore wings is longer than the pobrachial. Even if this were always true, the extreme triviality of such a character must strike any one who looks at the insect; but it happens that the two areolets are sometimes equal in length, and therefore the genus *Protelus* cannot be maintained.

Most of the *Meteori* are parasites of Lepidoptera, either singly, or, in the case of the smaller species, gregariously; a few have also been found to infest fungivorous Coleoptera. Several species form shining brown cocoons, in which they are found suspended by a thread of silk from leaves or branches of trees, and hence Latreille named one which he observed *pendulator*, supposed by Haliday to be *ictericus*, Nees, but it cannot now be identified with certainty; the cocoon of *ictericus* is figured by Curtis (B. E., 415). The head of the insect is always turned downwards, and, as it spins by the mouth, we have to account for the fact that somehow it is able to reverse its position in the air, since at the moment of its first suspension the head would naturally be uppermost; so far as I know, no observation has yet been made to explain this circumstance. Other species, including all the largest, and some smaller, weave whitish cocoons of a felted texture, which are never pensile, but fastened to leaves, &c., in the ordinary way. Some gregarious species heap their cocoons together in the manner of Microgasters; and those which live singly in the fungivorous larvæ of beetles attach the cocoon to the under side of the dead victim. This

diversity of habits appears to have no correspondence with variations of outward structure in the perfect insects, and offers no assistance in the classification of the numerous species.

Table of Species.

Section I. Tracheal grooves of the 1st abdominal segment distinct.

(4)	1. Radial areolet of the hind wings geminated by a transverse nervure.	
(3)	2. Præ- and pobrachial areolets of the fore wings equal in length. Antennæ 43—49-jointed	1. *albiditarsis*, Cur.
(2)	3. Præbrachial areolet of the fore wings shorter than the pobrachial. Antennæ 34—36-jointed	5. *caligatus*, Hal.
(1)	4. Radial areolet of the hind wings not geminated by a transverse nervure, or rarely with a faint vestige of one.	
(6)	5. Præbrachial areolet of the fore wings longer than, or equal to, the pobrachial	2. *chrysophthalmus*, Nees.
(5)	6. Præbrachial areolet of the fore wings shorter than (rarely equal to) the pobrachial.	
(32)	7. Recurrent nervure rejected into the 1st cubital areolet.	
(11)	8. Antennæ with about 40 (rarely with only 35—38) joints.	
(10)	9. Abdomen longer than the head and thorax. Hind femora, with their coxæ, as long as the abdomen. Condylus twice as long as its apical breadth	3. *deceptor*, Wesm.
(9)	10. Abdomen not longer than the head and thorax. Hind femora, with their coxæ, longer than the abdomen. Condylus less than twice as long as its apical breadth ..	4. *pallidus*, Nees.
(8)	11. Antennæ usually with fewer than 30 joints (rarely with 30, and more rarely with 36).	
(21)	12. Stigma pale, luteous or flavo-piceous; unicolorous or bordered beneath with fuscous.	
(14)	13. Face fuscous	9. *facialis*, Ruthe,
(13)	14. Face testaceous or rufescent.	
(20)	15. Furrow of the mesopleuræ deeply impressed, faintly cancellated.	
(17)	16. Colour entirely testaceous	6. *ictericus*, Nees, var.

(16) 17. Colour testaceous and black, or entirely black except the face, orbits, and 2d abdominal segment, which last is in that case piceous.

(19) 18. Antennæ more or less testaceous, the joints annulated with fuscous. Second abdominal segment, and sometimes the following segments, testaceous .. .. 6. *ictericus*, Nees.

(18) 19. Antennæ entirely black or blackish. Second abdominal segment piceous, the following segments black .. 7. *pallidipes*, Wesm.

(15) 20. Furrow of the mesopleuræ indistinct, and almost smooth .. .. 8. *confinis*, Ruthe.

(12) 21. Stigma fuscous, usually pale at the inner angle, sometimes also at the outer; or fuscous with a pale exterior margin.

(29) 22. Wings hyaline, or subhyaline, but never dark enough to show a pale streak beneath the stigma. Second cubital areolet hardly or not at all narrowed towards the radius.

(28) 23. Terebra as long as, or shorter than, the abdomen. Wings hyaline, but not whitish.

(27) 24. Abdomen ovate, not longer than the thorax. Head large, broader than the thorax. Stigma large, hardly smaller than the 1st cubital areolet.

(26) 25. Metathorax sloping gradually, not convex, almost smooth .. .. 10. *vexator*, Hal.

(25) 26. Metathorax regularly convex, rugulose .. .. 11. *obfuscatus*, Nees.

(24) 27. Abdomen lanceolate, as long as the head and thorax. Head not broader than the thorax. Stigma not remarkably large .. .. .. 12. *punctiventris*, Ruthe.

(23) 28. Terebra much longer than the abdomen. Wings whitish hyaline, or exceptionally subinfumated. (Recurrent nervure sometimes interstitial) .. .. 14. *atrator*, Cur.

(22) 29. Wings more or less infumated, showing a pale streak beneath the stigma. Second cubital areolet narrowed towards the radius.

(31) 30. Second abdominal segment rufous. Antennæ ♀ blackish, sometimes testaceous towards the base .. 16. *abdominator*, Nees.

(30) 31. Second abdominal segment black or dark piceous. Antennæ ♀ white, the apical half determinately fuscous .. .. 15. *albicornis*, Ruthe.

(7) 32. Recurrent nervure interstitial, or subinterstitial, *i. e.*, falling (but rarely) into the apex of the 1st cubital areolet, or the base of the 2d.

(34) 33. Terebra as long as the abdomen with the metathorax. Smallest species, 1⅓ lines long .. .. 13. *jaculator*, Hal.

(33) 34. Terebra shorter than, seldom as long as, the abdomen. Larger species.

(38) 35. Stigma fuscous, with or without a pale exterior margin.

(37) 36. Stigma with a pale margin; recurrent nervure ♂ ♀ subinterstitial 18. *pulchricornis*, Wesm.

(36) 37. Stigma without a pale margin; recurrent nervure ♀ evected, ♂ subinterstitial or evected .. 19. *melanostictus*, Cap., n.s.

(35) 38. Stigma pale or only slightly infuscated; sometimes margined with fuscous.

(40) 39. Terebra as long as the abdomen .. 22. *consors*, Ruthe.

(39) 40. Terebra as long as ⅓ or ⅔ of the abdomen.

(42) 41. Antennæ blackish; body blackish, with the scutellum and some other portions rufous; tips of the tarsi and of the hind tibiæ fuscous .. .. 20. *scutellator*, Nees.

41) 42. Antennæ testaceous tipped with fuscous; bodyand legs testaceous, only the 1st abdominal segment more or less infuscated; tips of the hind tibiæ seldom subinfuscated .. .. 21. *unicolor*, Wesm.

Section II. Tracheal grooves of the 1st abdominal segment obsolete.

(2) 1. Wings narrow, hardly longer than the abdomen, infumated, with a whitish streak beneath the stigma 17. *micropterus*, Hal.

(1) 2. Wings fully developed and hyaline, or nearly so.

(4) 3. First abdominal suture white; petiole whitish at the base (except in a var.) .. .. .. 23. *versicolor*, Wesm.

(3) 4. First abdominal suture and base of the petiole concolorous with the rest of the surface.

(12) 5. Stigma fuscous, its inner angle pale.

(9) 6. Head broader than the thorax.

(8) 7. First abscissa of the radius much shorter than the second. Terebra shorter than the abdomen. Petiole stout, shorter than the condylus 26. *propligator*, Hal.

(7)	8. First abscissa of the radius as long as the second. Terebra as long as the abdomen. Petiole slender, longer than the condylus ..	24. *filator*,* Hal.
(6)	9. Head narrower than the thorax.	
(11)	10. Petiole shorter than the condylus	27. *cinctellus*, Nees
(10)	11. Petiole and condylus of equal length	28. *tenellus*, n. s.
(5)	12. Stigma entirely pale.	
(16)	13. Antennæ ♀ filiform, almost always 26-jointed; those of the ♂ setaceous, not more than 28-jointed. Recurrent nervure interstitial or subinterstitial.	
(15)	14. Head, thorax, and abdomen more or less black	29. *leriventris*, Wesm.
(14)	15. Head, thorax, and abdomen rufo-testaceous, except the metathorax and 1st abdominal segment, which are black	30. *rubens*, Nees.
(13)	16. Antennæ of both sexes setaceous, 30—34-jointed. Recurrent nervure evected.	
(18)	17. Colour entirely pale testaceous ..	32. *luridus*, Ruthe, var.
(17)	18. Colour black and testaceous.	
(20)	19. Abdomen ♂ ♀ black, segment 2 testaceous, often with 2 fuscous spots	31. *fragilis*, Wesm.
(19)	20. Abdomen ♀ (except the 1st segment) rufo- or fusco-testaceous; of the ♂ infuscated at the apex	32. *luridus*, Ruthe.

1. *Meteorus albiditarsis*, Cur. (Pl. V., fig. 8, hind wing).

Zele albiditarsis, Cur., B. E., pl. ccccxv., ♂.
Meteorus albiditarsus, Hal., Ent. Mag., iii., 25, ♂; *M. albitarsis*, Hal., *lib. cit.*, 24, ♀; S. v. Voll., Pinac., pl. xliv., f. 1, ♂ with details of palpi; f. 2, ♀.
Perilitus albitarsis, Nees, Mon., i., 34, ♀.
M. albitarsis, Ruthe, Berl. ent. Zeits, 1862, p. 9 ♂ ♀.
P. dispar, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 22, ♂ ♀; pl. i., f. 3 (wing).

♀. Rufo-testaceous; eyes during life green; stemmaticum, claws, and valves of the terebra, fuscous; hind tarsi whitish. ♂. Nigro-piceous; orbits, abdomen in the middle more or less, and legs, dull rufous; hind coxæ, femora, and tibiæ infuscated, their tarsi whitish. Wings ♀ testaceo-hyaline, squamulæ and stigma

* Sp. 25, *delator*, Hal., requires to be rediscovered, and is here omitted.

luteous, nervures fuscous; of the ♂ fusco-hyaline, squamulæ testaceous, nervures and stigma fuscous; præ- and pobrachial areolets of the fore wings of equal length; radial areolet of the hind wings divided by a distinct transverse nervure. Terebra as long as the 1st abdominal segment. Length, 3—4½; wings, 6—9 lin.

The larger size is more usual, but one ♂ of those before me is only 3 lines long. Head transverse; front excavated; eyes large, glabrous; face transverse, beset with short white hairs; clypeus with longer hairs, convex, prominent; mandibles dark at the tips; palpi elongate, pallid. Antennæ ⅓ longer than the body, slender, setaceous, those of the ♂ usually 47—49-, of the ♀ 43—49-jointed. Mesothoracic sutures strongly impressed. Mesopleuræ punctate, beneath the wings smooth. Metathorax short, rounded, irregularly (in the ♀ subobsoletely) rugose and reticulated, with a fine medial carina. Abdomen as long as the head and thorax and as wide, after the middle; that of the ♀ subfalcate, compressed; suturiform articulation subobsolete; segment 1 forming ⅔ of the whole abdomen, obsoletely aciculated, three times broader at the apex than at the base; tubercles placed just before the middle; tracheal grooves distinct. Nervures of the wings stouter and darker in the ♂; recurrent nervure interstitial or rejected; 2d cubital areolet somewhat longer than broad; 1st intercubital nervure much longer than the 2d.

The ♂ is very like that of *deceptor*, sp. 3; the ♀ strongly resembles both *chrysophthalmus* and *deceptor* in the present genus, as well as *Zele testaceator*, Cur., among the *Macrocentrides*.

Not uncommon from May to September. Described from five males, six females, contributed by Bignell, Billups, Bridgman, and Fitch; taken in Darenth Wood, in Devonshire, near Cardiff, Lynn, St. Albans, &c. A solitary parasite; the ♂ was bred by Bridgman, but from what source I am not informed. Cocoon 6 lines long, felted, stramineous, with some loose flocculence.

2. *Meteorus chrysophthalmus*, Nees.

Bracon chrysophthalmus, Nees, Mag. Ges. Berl., 1811, p. 21.

Perilitus chrysophthalmus, Nees, Mon., i., 34; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 24; *M. chrysophthalmus*, Ruthe, Berl. ent. Zeits., 1862, p. 11, ♂ ♀; S. v. Voll., Pinac., pl. xliv., f. 3, ♀; Ratz., Ichn. d. Forst., iii., 59.

? Bracon chlorophthalmus, Spin., Ins. Lig., ii., 133, ♀.
M. chlorophthalmus, Hal., Ent. Mag., iii., 26, ♂ ♀.

Rufo-testaceous; antennæ fuscous except at the base; front, vertex, occiput, thorax, especially the metathorax, and petiole of the 1st segment, often more or less infuscated; eyes during life green; stemmaticum, claws, and valves of the terebra fuscous; hind tarsi often whitish at the apex. Wings testaceo-hyaline, squamulæ and stigma luteous; nervures fusco-testaceous; præbrachial areolet of the fore wings longer than, or sometimes equal to, the pobrachial; recurrent nervure interstitial (seldom subrejected); radial areolet of the hind wings not divided, or rather, the transverse nervure is decolorous. Terebra more than ¾ the length of the abdomen. ♂ ♀. Length, 2¾—3½; wings, 5—6½ lin.

The sexes are alike in colour, and subject to the same variations; Ruthe and Wesmael had males with the entire thorax fuscous, but usually the infuscation is confined to the parts above mentioned. Head as in the last species, but the eyes are much smaller, and not glabrous. Antennæ longer than the body, setaceous, those of the ♂ 38—42-, of the ♀ 31—39-jointed. Mesothorax punctulate, the sutures distinct, enclosing a large rugulose depression before the scutellum. Mesopleuræ punctulate throughout, and beneath the (usually fuscous) furrow, almost rugulose. Metathorax short, regularly rounded, finely rugulose and reticulated, more strongly behind, where it is beset with white pubescence, and having a fine medial carina. Abdomen as long as the head and thorax, rather narrower than the latter; that of the ♀ not subfalcate, and hardly compressed; suturiform articulation nearly effaced; segment 1 more or less finely punctato-rugulose, often smooth posteriorly, forming ⅔ of the whole abdomen, about three times wider at the apex than at the base; petiole very slender; tubercles antemedial; tracheal grooves distinct. Wings hyaline with a yellowish tinge, sometimes subfusco-hyaline; stigma luteous in both sexes; radial areolet of the hind wings at first sight not divided; the transverse nervure, however, is visible in certain lights, paler and more attenuated than in *M. caligatus*; 2d cubital areolet subquadrate. The terebra is not black, as described by Ruthe, but rufous, subulate, with stout fuscous valves.

This species is difficult to distinguish from *M. deceptor*, in the female sex; but in *chrysophthalmus* the præbrachial areolet of the fore wings is never shorter than the pobrachial. *Bracon chlorophthalmus*, Spin., referred by Haliday to this species, but by Nees to the genus *Rhogas*, cannot now be certainly determined.

Not uncommon, but the notices of its occurrence are mostly doubtful, owing to its having been confused with *M. deceptor*. Described here from four females and one male in Fitch's collection, taken by him, Bridgman, and Bignell in their respective districts; found also by Billups at Peckham, and by me in Yorkshire. Bignell bred the ♀ from *Odontoptera bidentata*, Clerck, and S. v. Vollenhoven reported the rearing of another at the Hague from *Heterogenea limacodes*, Hufn. According to Ratzeburg it was bred by Brischke from *Rhodophæa suavella*, Zinck. The cocoon is not noticed, but probably resembles that of *M. deceptor*.

3. *Meteorus deceptor*, Wesm. (Pl. V., fig. 6 ♀, fig. 7 ♂).
Perilitus deceptor, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 26, ♂ ♀.
M. deceptor, Ruthe, Berl. ent. Zeits., 1862, p. 12, ♂ ♀.

♀. Rufo-testaceous; eyes during life green; antennæ towards the tips, claws, and valves of the terebra, fuscous; hind tarsi testaceous. ♂. Nigro-piceous; base of the antennæ, face, orbits, scutellum, abdominal segments 2–3, or more, and legs, rufo-testaceous; hind femora infuscated, their tibiæ blackish except at the base, their tarsi rufo-testaceous. Wings of the ♀ testaceo-hyaline, squamulæ and stigma luteous, nervures fusco-testaceous; of the ♂ fusco-hyaline, nervures and stigma fuscous; præbrachial areolet of the fore wings shorter than, sometimes as long as, the pobrachial, but never longer; recurrent nervure rejected; radial areolet of the hind wings not divided. Terebra as long as half the abdomen. ♂ ♀. Length, 3—3½; wings, 5½—6⅓ lin:

Var. ♀. Coloured like the ♂, only the abdomen after the 1st segment is entirely testaceous. Reinhard.

The ♂ strongly resembles that of sp. 1, and must be distinguished by the hind wings. The discrimination of both sexes from *chrysophthalmus* is less easy, inasmuch as the few differences that exist are liable to exceptions. The recurrent nervure, however, is always rejected, and the præbrachial areolet never longer than the pobrachial. The present species is somewhat smaller, the ♂ more darkly coloured, especially as to the hind tibiæ, and the terebra of the ♀ shorter. Antennæ longer than the body, setaceous, those of the ♂ 38—44-, of the ♀ 35—40-jointed. Vertex and occiput of the ♀ sometimes infuscated; mandibles dark at the tips; petiole of the 1st segment occasionally fuscous at the base; abdomen obliquely truncated at the apex; tarsi a little paler towards the tips. The

hind tarsi of the ♂ appear paler than they really are, an illusion caused by the blackness of the tibiæ. The frontal excavation behind the antennæ is geminated by a carina. Pleuræ finely rugulose. Mesothorax impunctate, the sutures deeper behind, enclosing a wide rugose space bisected by a longitudinal carina. Abdomen as in the preceding species; condylus twice as long as its apical breadth. Hind femora, with their coxæ, as long as the abdomen.

Described from 18 males and 22 females. More common than *chrysophthalmus* throughout the country, and found now in all collections, yet it does not seem to have been known to Haliday. Capron describes it as abundant near Guildford. I obtained five males in a very short time by beating a single hedge near Abergavenny. It has been repeatedly bred in England, but some of the cases recorded perhaps belong rather to *chrysophthalmus*: the following are selected as certainly authentic. Fitch reared a ♀, June 14th, and Bignell two males, June 17th, from *Crocallis elinguaria*, L.; the latter has also obtained the ♀ from *Himera pennaria*, L., and *Hadena oleracea*, L.; the ♂ from *Odontoptera bidentata*, Clerck, and *Anarta myrtilli*, L. Probably also it is the species referred to as *chrysophthalmus* in E. M. M., xi., 66, bred by Hellins out of *Erastria fasciana*, L.; S. v. Vollenhoven mentions the rearing of three females at the Hague from the same host. Wesmael found it commonly near Brussels, and many examples are in his unnamed collection, which is now in my hands. A solitary parasite. Cocoon white, felted, papyraceous, 5 lines long, not pensile, fusiform, the head of the insect being turned towards the smaller end.

4. *Meteorus pallidus*, Nèes.

Bracon pallidus, Nees, Mag. Ges. Berl., 1811, p. 22; not of Bouché, which is *Rhogas circumscriptus*, Nees; *cf.* Nees, Mon., ii., 399.

Perilitus pallidus, Nees, Mon., i., 35, ♂ ♀.

Rufo-testaceous; antennæ except the base, head more or less, prothorax, pectus, and metathorax (of the ♂) fuscous or piceous; hind tarsi paler; claws fuscous. Wings testaceo-hyaline, squamulæ and stigma luteous, the latter rufous in the ♂; nervures fusco-testaceous; præbrachial areolet of the fore wings shorter than the pobrachial; recurrent nervure rejected (or sometimes almost interstitial); radial areolet of the hind wings not divided by a transverse

nervure. Abdomen shorter and broader than in *deceptor*, in the ♂ clavate; 1st segment punctato-rugulose on the petiole; the condylus smooth, except a few basal scratches, and less than twice as long as its apical breadth; tracheal grooves distinct. Hind femora with the addition of their coxæ, longer than the abdomen. Terebra, seen from above, as long as the 4 last segments. ♂ ♀. Length, $2\frac{3}{4}$; wings, $5\frac{1}{2}$ lin.

Antennæ longer than the body, filiform, in the ♀ testaceous, annulated with fuscous, gradually darkened to the apex, the 2 basal joints piceous, 36—39-jointed; in the ♂ broken, blackish, except the 4 basal joints. Head rather broader than the thorax; orbits black (in the ♀ described by Nees); occiput and stemmaticum sometimes fuscous. Metathorax irregularly subreticulate, with or without a faint medial carina. Abdomen of the ♀ ovato-clavate, somewhat compressed; of the ♂ broader and flatter; not longer than the head and thorax; 1st segment subdeplanate, shorter and broader than in *deceptor*; tubercles medial, salient. The ♂ is darker than the ♀, having the whole thorax rufo-piceous, except the disk of the mesothorax.

Differs from *deceptor* in size, and in the proportion of parts, as stated in the table; and distinguished from all the following species by the greater number of joints in the antennæ, for the ♂, though mutilated, must once have had at least 40 joints. There is nothing like it in Ruthe's collection, nor was it known to Wesmael and Haliday; Förster, however, quotes it as a type of the whole genus. Nees states that he has united the two sexes with some hesitation; but there is nothing doubtful about the male and three females which I have seen.

Nees captured the ♀ among oaks in Franconia, Aug. 23rd; the ♂ was communicated to him by Gravenhorst. With us it seems to be a northern species; I found a ♀ in the Yorkshire moors, two more from Sutherlandshire are in Bridgman's collection, and Champion presented me with ♂ ♀ from the pine-forest of Rothiemurchus in the Grampians.

5. *Meteorus caligatus*, Hal.

Meteorus caligatus, Hal., Ent. Mag., iii., 25, ♂ ♀.

Black, shining; 2d abdominal segment and legs rufo-testaceous; hind femora at the apex, hind tibiæ, and their tarsi, fuscous; base of the former pallid or whitish. Wings fusco-hyaline, squamulæ

flavo-testaceous, stigma and nervures fuscous; præbrachial areolet of the fore wings shorter than the pobrachial; recurrent nervure rejected; radial areolet of the hind wings divided by a faint transverse nervure. Abdomen subpetiolated, 1st segment short, broad. Terebra shorter than the 1st segment. ♂ ♀. Length, 2½; wings, 5 lin.

This species stands alone; with those already described it has no near connection, except the divided radial areolet of the hind wings, and differs from all species in the shortness and width of the 1st abdominal segment. The sexes are similar. Antennæ setaceous, of the ♂ 36-jointed, much longer than the body; of the ♀ 34-jointed, a little longer than the body; piceous beneath at the base. Mandibles testaceous; palpi very pale, the maxillary elongate. Eyes large. Mesothorax shining, with a few lateral punctures, the sutures shallow, surrounding a rugulose space before the scutellum, bisected by a longitudinal carina. Metathorax shining, not very convex, with some punctures and transverse wrinkles, rectangular behind. First abdominal segment almost smooth, having a stout short petiole about ⅓ as broad as the segment at the apex; tubercles medial; tracheal grooves distinct; condylus obconic, not much narrower than the 2d segment; segments 2—3 connate, testaceous, black at the apex, and more or less at the sides. Coxæ testaceous; hind legs infuscated, the base of their tibiæ narrowly pallid; in the ♂ all the legs are less brightly coloured. Terebra short, its valves stout, black.

Apparently uncommon, not noticed by any writer but Haliday, who discovered it in North Ireland and the Hebrides. Bignell, however, has bred a female in Devonshire, June 23rd, and W. H. B. Fletcher two males and two females out of *Eupithecia expallidata*, Guenée; these last are from Abbot's Wood. In Fitch's collection is a male ticketed as having been found in a gall of *Cynips Kollarii*, Hartig. A solitary parasite. Cocoon oval, whitish, felted, papyraceous, not pensile.

6. *Meteorus ictericus*, Nees.

Bracon ictericus, Nees, Mag. Ges. Berl., 1811, p. 22, pl. ii., f. 6, ♀; not of Bouché, Naturg. (1834), p. 148.

Perilitus ictericus, Nees, Mon., i., 37, ♀; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 27; Ratz., Ichn. d. Forst., ii., 55, ♂ ♀.

Meteorus ictericus, Ruthe, Berl. ent. Zeits., 1862, p. 14, ♂ ♀; S. v. Voll., Pinac., pl. xliv., f. 4, ♀ (and abdomen magnified).

M. pendulator, Hal., Ent. Mag., iii., 28, ♂ ♀ partim; his ♂ vars. ε, ζ, are probably *M. pulchricornis*, Wesm.

Zele ephippium, Cur., B. E., 415.

Variable; rufo-testaceous, usually black above, except the head and 2d abdominal segment; stemmaticum black; antennæ fuscous, the base rufous; hind tibiæ at the apex, and tarsi, infuscated; valves of the terebra black. Wings hyaline, squamulæ yellow, stigma the same or luteo-fuscous, its inner edge often fuscous, nervures fusco-testaceous; recurrent nervure rejected; 2d cubital areolet slightly narrowed towards the radius. Tracheal grooves distinct. Terebra not much shorter than the abdomen. ♂ ♀. Length, $2\frac{1}{4}$—$2\frac{1}{2}$; wings, $4\frac{1}{2}$—5 lin.

The varieties are thus arranged by Ruthe, from 56 examples:—

Males: posterior segments constantly dark.

Var. 1. Head and mesothorax rufo-testaceous, immaculate; or the latter fuscous in the middle of the base.

Var. 2. Head rufo-testaceous; mesothorax with 3 inchoate fuscous lines; disk of the metathorax blackish; 1st abdominal segment scarcely darker than the 2d.

Var. 3. Head the same; mesothorax with 3 fuscous lines; mesopleuræ rufous, bounded with black.

Var. 4. Head the same; entire thorax above infuscated or blackish; pleuræ and pectus rufo-testaceous, or more or less infuscated.

Var. 5. Frons, vertex, and occiput infuscated; mesothorax with 3 fuscous lines; scutellum paler or darker fuscous; pleuræ and pectus fuscous.

Var. 6. Frons, vertex, and occiput infuscated, leaving (as in var. 5) the orbits broadly testaceous; entire thorax, as well as pleuræ and pectus for the most part, fuscous; 2d abdominal segment yellow.

Females: posterior segments more or less testaceous.

Var. 7. Entirely dull testaceous.

Var. 8. Only the 1st abdominal segment fuscous; sometimes the metathorax slightly infuscated.

Var. 9. Metathorax and 1st abdominal segment fuscous; mesothorax unicolorous, or with 1—3 faint fuscous lines.

Var. 10. Mesothorax and scutellum more or less infuscated.

Var. 11. Mesothorax rufo-testaceous: metathorax, 1st abdominal segment, as well as the 4th and following more or less, fuscous.

Var. 12. Mesothorax entirely, pectus and pleuræ more or less, fuscous; pleuræ usually fuscous, with a rufous medial spot; abdomen blackish at both ends.

The species is extremely difficult to determine, as well from variations of sculpture as from the instability of the colours. Nevertheless, English specimens are less variable than those in Ruthe's collection, and will be found in general to correspond with the diagnosis. Described from 27 females and 2 males. Face subquadrate, flat, sometimes with a slight elevation above the clypeus, looking, from above or below, like a carina. Palpi pale, whitish. Antennæ ♂ ♀ about the length of the body, setaceous, 27—35-jointed, testaceous, dusky towards the apex, each joint also annulated with the same colour. Eyes villose; ocelli prominent. Prothorax always rufo-testaceous. Metathorax usually rugulose and reticulated, with greater or less distinctness; without a medial carina; but often exhibiting on the disk two smooth subquadrate areæ separated by a carina; intermediate forms are not wanting. Abdomen as long as the head and thorax; 1st segment $\frac{1}{3}$ or $\frac{2}{5}$ of its entire length, striolated; petiole slender, elongate, but varying somewhat in length and thickness. Stigma yellow, more or less pale, usually unicolorous, but not seldom bordered with fuscous, especially beneath; 2d cubital areolet narrower than its height, and very slightly narrowed towards the radius; recurrent nervure always more or less rejected, never absolutely interstitial.

This is perhaps the commonest British species, and abounds likewise in other parts of Europe. Bignell bred the ♂ from *Dictyopteryx Bergmanniana*, L.; Elisha the ♀, July 6th, from *Lacerna conturbatella*, Hüb.; J. E. Fletcher another from a larva found rolled up in a leaf of *Rubus idæus*. Curtis (B. E., ccccxv.) has figured the cocoon, which he says is frequently found on the hazel, and by himself in Coombe Wood; one cocoon produced the universal hyperparasite *Hemiteles areator*, Panz. Haliday, who had the means of knowing, is the authority for referring Curtis's insect to this species. Ratzeburg bred a ♀ from *Cheimatobia brumata*, L., and states (Ichn. d. Forst,, ii., 55) that a specimen bred by Bouché from *Pyralis farinalis*, L., is undoubtedly the same species; but there must be a mistake here, since the cocoon of Bouché's insect (Naturg., 1834, p. 148) is

described as "albus, chartaceus," and not pensile. The cocoons described by DeGeer and referred to by Haliday (Ent. Mag., iii., p. 29, note), although pensile, were white, and there is nothing to show that they belonged to *ictericus*; moreover, they were obtained from *Bombyx processionea*, L. I have no cocoon at hand, but, assuming the figure given by Curtis to be correct, as is most likely, it is pensile, yellowish brown, shining, and semitransparent, like those of several of the following species.

7. *Meteorus pallidipes*, Wesm.

Perilitus pallipes, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 29, ♂ ♀.

Meteorus pallipes, Ruthe, Berl. ent. Zeits., 1862, p. 16, ♀.

Black; face, clypeus, and orbits of the eyes broadly, rufous; mouth and legs testaceous; 4 posterior tarsi fuscescent; 2d abdominal segment piceous or subrufous, but often black: antennæ fuscous, paler at the extreme base. Wings nearly hyaline, squamulæ and stigma yellow, the latter often edged with fuscous; nervures fusco-testaceous; recurrent nervure rejected; 2nd cubital areolet not narrowed towards the radius. Tracheal grooves distinct. Terebra as long as $\frac{3}{4}$ of the abdomen. ♂ ♀. Length, $2\frac{1}{2}$; wings, 5 lin.

Var. Face and clypeus paler; mandibles and palpi whitish; 2d abdominal segment testaceous. Ruthe.

Strongly resembles *ictericus*, Nees, but, besides the black colour, it may be known by the nearer approach of the eyes in front, whereby the face becomes narrower below than above; the shape of the 2d cubital areolet; and the comparative shortness of the petiole. Antennæ ♂ ♀ 28—31-jointed, as long as the body, filiform, nigro-fuscous, the 2 basal joints hardly paler. Under side of the prothorax piceous. Wesmael's specimens had the humeral angles of the mesothorax rufous, which was not the case with Ruthe's, nor is it seen in the English examples. Metathorax short, convex, almost vertical behind, intricato-rugose. First abdominal segment striolated, more convex transversely, and with a shorter and broader petiole than that of *ictericus*; segment 2 entirely black, piceous, or piceo-testaceous. Second cubital areolet large, very little broader than long, not narrowed towards the costa; recurrent nervure entering the 1st cubital areolet close to its lower angle.

Described from two females, one male, taken near Abergavenny, St. Albans, and Northampton; and three females in Fitch's collection, captured by Bridgman. Taken not uncommonly by Capron at Shiere.

8. *Meteorus confinis*, Ruthe.

Meteorus confinis, Ruthe, Berl. ent. Zeits., 1862, p. 18, ♀.

Rufo-testaceous, variable: palpi whitish; antennæ fuscous at the tips, and all the articulations dusky; legs and 2d abdominal segment always pale testaceous; stemmaticum, occiput, 3 patches on the lobes of the mesothorax, disk of the metathorax, with the rest of the abdomen, more or less piceous or black; joints of the 4 posterior tarsi tipped with fuscous. Wings hyaline, squamulæ and stigma yellow, the latter edged beneath with fuscous; nervures fuscous; recurrent nervure rejected; 2d cubital areolet somewhat narrowed towards the radius; radius distinct, but the other outer nervures of both wings decolorous. Tracheal grooves distinct. Terebra as long as the abdomen. ♂ ♀. Length, $1\frac{3}{4}$; wings, $3\frac{1}{2}$ lin.

Another species closely allied to *ictericus*, but certainly distinct. It is much smaller: the joints of the antennæ are fewer in number; the outer longitudinal nervures of the wings are obsolete; the 1st abdominal segment is broader and shorter in proportion. The extremes of coloration (in six examples) are as follows: the palest ♂ has only the apex of the abdomen black, the other markings are pale piceous and subobsolete; the darkest has all the markings above mentioned equally black; the others, and the ♀, are intermediate. Ruthe possessed only two females; having taken the ♂, I am able to complete the description. Antennæ of the ♂ longer than the body, testaceous or fuscous, darker towards the tips, 29-jointed; of the ♀ 27-jointed, about $\frac{3}{4}$ the length of the body. Metathorax intricato-rugulose, obliquely truncated behind, the posterior surface presenting a smooth area, margined by a raised line. First abdominal segment about $\frac{2}{3}$ of the length of the abdomen, faintly and irregularly striolated, darkest in the middle, the two ends testaceous.

Common. Very likely to be confounded with *ictericus*.

I found five males, one female, in meadows near Northampton, and three males, one female, near Leicester.

9. *Meteorus facialis*, Ruthe.

Meteorus facialis, Ruthe, Berl. ent. Zeits., 1862, p. 22, ♀.

♀. Black; orbits of the eyes above and behind obscurely rufous (or there is a dull rufous spot on each side of the vertex); antennæ testaceous, fuscous at the apex; or fuscous, the base of the flagellum testaceous, the scape and the other joints piceous; 2d abdominal segment, and legs, rufo-testaceous, hind pair of the latter somewhat darker, their coxæ piceous, and their tarsi subinfuscated. Wings hyaline, stigma luteous, its outer and lower angles indeterminately brown; squamulæ rufo-testaceous, nervures pale fuscous; recurrent nervure considerably rejected; 2d cubital areolet very slightly narrowed towards the radius. Tracheal grooves minute. Terebra equal to $\frac{3}{4}$ of the abdomen.

♂. Black; legs and lateral margins of the 2d abdominal segment piceous. Wings slightly infumated; squamulæ testaceous; nervures piceous; stigma fuscous, with a pale spot at the inner angle; recurrent nervure joining the 1st cubital areolet at about $\frac{3}{4}$ of its length. ♂ ♀. Length, 2—$2\frac{1}{3}$; wings, $4\frac{1}{2}$—$4\frac{2}{3}$ lin.

The form is that of *ictericus*, and the size nearly equal. Head a little narrower than the thorax, much contracted behind the eyes; face subquadrate, shining brown in the ♀, clypeus of the same colour, convex, smooth; on each side of the vertex is an orbital spot, dull red, narrowly prolonged towards the antennæ, and continued round the posterior margin of the eyes, becoming wider beneath (in the English ♀ there is merely a vertical spot). Palpi pale brown. Antennæ ♂ filiform, longer than the body, 35-jointed; of the ♀ rather stout, shorter than the body, filiform, 28—32-jointed. Pro- and mesothorax entirely black or blackish, beset with whitish pubescence more thickly than in most other species. Mesothorax with two crenulate striæ ending before the scutellum in a rugose depression. Pleuræ rugose, with a shining smooth medial space; the usual furrow wide, shallow, and rugose. Metathorax convex, intricato-rugulose, with a faint medial carina. Abdomen as long as, and narrower than, the head and thorax; segment 1 black, its apex piceous; segment 2 in the ♀ testaceous, the rest nigro-piceous; in the ♂ only the margins of the 2d segment are piceous; belly of the same colour. Segment 1 slender, but the petiole not much narrowed, finely striolated, the striæ confused and subreticulate; tubercles situated at about $\frac{1}{3}$ from the base. First abscissa of the radius shorter than the 2d. According to Ruthe the recurrent nervure is rejected into the 1st cubital areolet somewhat more than the length of the 1st abscissa.

For the description of the ♂ I am indebted to Capron; it is remarkable for having dark-coloured legs, not often seen in the present genus.

The ♂ was taken by Capron at Shiere, and the ♀ by me near Barnstaple.

10. *Meteorus rexator*, Hal.

♀. "Black, shining; mouth, antennæ at the base, and legs, ferruginous; segment 1 obconic, elongate, and attenuated at the base; stigma very large, fuscous, with a pale spot; terebra as long as the abdomen. Very like *delator* (sp. 25), and *filator* (sp. 24), intermediate in size, and distinguished from *filator* by a shorter petiole. Eyes large; clypeus narrowed inferiorly, fusco-ferruginous; antennæ 19—20-jointed." Haliday.

♂. Antennæ longer than the body, 29-jointed, fuscous, joints 1—2 rufous. Sides of the prothorax testaceous; 1st abdominal segment at the apex, and 2d at the base, indeterminately pale piceous; legs testaceous. Wings subfusco-hyaline; squamulæ testaceous; nervures piceous; stigma fuscous, conspicuous, as large as the 1st cubital areolet; 2d cubital areolet much narrowed towards the radius, forming a truncated triangle; recurrent nervure interstitial. Metathorax not convex, sloping gradually from the base, almost smooth, crossed near the base by a transverse carina. Abdomen shorter than the thorax; 1st segment irregularly striolated, short, three times broader at the apex than at the petiole; posterior segments broad, ovate. Head large, broader than the thorax. Tracheal grooves distinct. ♂. Length, 1½; wings, 3¼ lin.

Not common, according to Haliday. The ♀ is unknown to me; the ♂ I took in Leicestershire; the great size of the stigma refers it to this species, but the condition is bad, and the colours obscured; that of the wings may be entirely fallacious.

11. *Meteorus obfuscatus*, Nees.

Bracon obfuscatus, Nees, Mag. Ges. Berl., 1811, p. 22, ♂.
Perilitus obfuscatus, Nees, Mon., i., 37, ♂; Ratz., Ichn. d. Forst., ii., 55, ♂ ♀.
Meteorus obfuscatus, Hal., Ent. Mag., iii., 31, ♂ ♀.
Zele thoracicus, Cur., B. E., 415, 9.

Perilitus formosus, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 36, ♀ ; *Meteorus formosus*, Reinh., Berl. ent. Zeits., 1862, p. 26, note, ♂ ♀ .

Variable ; usually black, palpi and legs testaceous; pro- and mesothorax, with the scutellum, and abdominal segments 2—3, rufo-testaceous ; 3 fuscous spots on the mesothoracic lobes ; antennæ rufo-testaceous on their basal half, thence to the apex fuscous. Wings hyaline ; squamulæ testaceous ; nervures fuscescent, becoming testaceous outwardly ; stigma large, fuscous, its inner angle determinately testaceous; recurrent nervure rejected or subrejected ; 2d cubital areolet not narrowed towards the radius. Tracheal grooves distinct. Terebra somewhat shorter than the abdomen. ♂ ♀ . Length, 2—2¼ ; wings, 4—4½ lin.

In varieties the mesothorax or the abdomen may be entirely black or piceous, and the pectus rufo-testaceous ; or the abdomen more or less piceous, and paler in the middle ; but in any case the species is sufficiently declared by its structure. Head broader than the thorax, hardly contracted behind the eyes. Antennæ of the ♀ not much longer than ½ the body, submoniliform at the apex, 24—27-jointed (according to Reinhard even 23-jointed) ; those of the ♂ longer than the body, filiform, 29—30-jointed. Metathorax short, abruptly sloping, almost truncate behind, hardly excavated posteriorly, reticulato-rugulose, indistinctly areated by a medial carina which bifurcates at the declivity. First abdominal segment irregularly striolated, with a short, margined petiole ; tubercles not salient, antemedial.

Described from 16 females, 10 males. The synonymy above given is not at all doubtful, notwithstanding some small discrepancies in the authors cited, due to the want of sufficient examples, or to the attachment of too much importance to colours. A common, solitary parasite of fungivorous larvæ of Coleoptera. Wesmael was the first to suspect this circumstance : he received specimens from Liége found among *boleti*, and considered it probable that they came out of *Orchesia micans*, Panz., which was common in the same locality. This has since been abundantly confirmed : according to Ratzeburg many examples were reared from this beetle by Reissig, Wissmann, and Tischbein. In my collection are six specimens, the remains of a larger number, which were given to me together with an *Orchesia*, to show from what source they were bred. In Fitch's collection are 20 on a card, procured from a *boletus* on an apple-tree at

Maldon in July; Capron finds the species at Shiere, near Guildford. According to Reinhard, Sichel's collection at Paris contains a set of 10 reared from the larvæ of *Triplax russica*, L., by Lespès. The whitish cocoons of the parasites are attached to the bellies of the larvæ.

12. *Meteorus punctiventris*, Ruthe.

Meteorus punctiventris, Ruthe, Berl. ent. Zeits., 1862, p. 25, ♂ ♀.

Black; variable; clypeus, mouth, palpi, mesothorax sometimes in part, 2d abdominal segment, and legs, flavo-testaceous; hind coxæ sometimes more or less piceous; antennæ not paler at the base, only the radicle testaceous. Wings subhyaline; squamulæ testaceous; stigma fuscous, more or less determinately pale at the base; recurrent nervure falling into the extreme apex of the 1st cubital areolet, subinterstitial; 2d cubital areolet not narrowed towards the radius. Tracheal grooves distinct. First abdominal segment punctate in the middle longitudinally, rimulose at the sides. Terebra as long as the abdomen. ♂ ♀. Length ♂ 1⅔—2⅓; wings, 3—4 lin.; ♀ 1½—1¾; wings, 2½—3 lin.

Var. *α*. ♀. Mesothoracic sutures, the space before the scutellum into which they connive, and sides of the prothorax, testaceous.

Var. *β*. ♂. Stigma fuscous, hardly paler at the base; 2d abdominal segment fuscous at the sides.

Var. *γ*. ♂ ♀. Face, orbits, and sides of the thorax obscurely rufous. Antennæ fusco-testaceous, darker towards the apex. Ruthe's two specimens.

Head black, only the clypeus and sometimes the lower part of the face, testaceous; vertical orbits in one specimen with an indistinct rufous line. Thorax either entirely black, or the sides and disk testaceous, but so that black patches remain upon the 3 mesothoracic lobes. Four posterior tarsi, and tips of the hind femora, with their tibiæ, subinfuscated. Both sexes vary considerably in size, but the smallest ♀ was bred together with the others, leaving no doubt of its identity.

Head as wide as the thorax, rounded behind the eyes; face somewhat transverse, narrowed beneath; clypeus shining, moderately convex. Antennæ ♂ 31—32-jointed, setaceous, longer than the body; of the ♀ 28—29-jointed, longer than the head and thorax, the 6 ante-apical joints as broad as long. Pleuræ shining, sparingly aciculated. Metathorax intricato-rugulose. Abdomen as long as the head and thorax, equally attenuated at both ends in

the ♀, more obtusely lanceolate in the ♂; segment 1 shaped as in *ictericus*, with a medial row of confused punctures which become striæ on each side, and are a good character for the determination of the species; segment 2 blackish on its hinder margin; the rest nigro-piceous, becoming paler towards the anus. Stigma half fuscous, half yellow, or the dark colour predominates more or less; 2d cubital areolet trapeziform. The males are larger than the females (those at least seen by me), and less disposed to exhibit testaceous markings.

Described from nine males, four females. The latter were bred by Porritt from *Scoparia angusta*, Ste. Two males in Fitch's collection were reared from *Scoparia murana*, Cur., by W. H. B. Fletcher. Bignell captured sixteen females, two males, on a plum-tree, and four other males elsewhere in South Devon. I found several specimens, all males, in the neighbourhood of Teignmouth.

13. *Meteorus jaculator*, Hal.

Meteorus jaculator, Hal., Ent. Mag., iii., 34, ♀.
M. obscurellus, Ruthe, Berl. ent. Zeits., 1862, p. 29, ♀.

Black; metathorax and abdomen sometimes piceous; mouth and clypeus testaceous; palpi pale; mandibles tipped with fuscous; antennæ and 4 posterior tarsi fuscous, the rest of the legs testaceous or pale piceous, hind tibiæ sometimes darker. Wings whitish hyaline; squamulæ pale; stigma piceous, scarcely paler at the base; nervures pale; recurrent nervure subinterstitial; 2d cubital areolet narrowed towards the radius. Tracheal grooves distinct. Terebra as long as the abdomen and metathorax. ♂ ♀. Length, $1\frac{1}{3}$; wings, $2\frac{1}{2}$ lin.

The smallest British species. Antennæ of the only ♂ 26-jointed, rather longer than the body; of the ♀ equal to $\frac{3}{4}$ of the body, 20—25-jointed, entirely piceous, the subapical joints scarcely longer than broad. Face transverse, not narrowed inferiorly, with an impression at the base of the clypeus. Pleuræ nearly smooth, the usual furrow having only a few wrinkles. Metathorax narrowed posteriorly, finely reticulato-rugulose, its hinder declivity not defined. Anterior margin of the 2d abdominal segment paler than the rest of the surface; segment 1 obconic, hardly curved, finely rimulose, its apex almost smooth; tracheal grooves minute. Wings and stigma rather large; nervures of great tenuity; cubital and anal nervures decolorous. Legs pale, with a piceous shade on the hind coxæ, tibiæ, and tarsi.

Described from six females, one male, in Fitch's collection and my own, taken near St. Albans and Leicester. Found by Haliday rarely in North Ireland; in Germany once by Ruthe. Capron has taken a ♀ at Shiere.

14. *Meteorus atrator*, Cur.

Zele atrator, Cur., B. E., 415, 1, ♀.
Meteorus atrator, Hal., Ent. Mag., iii., 32, ♀.
Perilitus similator, Nees, Mon., i., 41, ♀; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 34, ♂ ♀.
Meteorus similator, Ruthe, Berl. ent. Zeits., 1862, p. 33, ♂ ♀.

Black; antennæ at the base, mouth, clypeus, prothorax wholly or in part, and legs, testaceous; hind legs infuscated; 2d abdominal segment rufo-testaceous or piceous. Wings hyaline or subinfumated; squamulæ testaceous; stigma fuscous, hyaline at the base and more narrowly at the apex, or unicolorous; recurrent nervure slightly rejected, sometimes interstitial; 2d cubital areolet broad, subquadrate. Tracheal grooves distinct. Terebra as long as the abdomen and metathorax. ♂ ♀. Length, 2—2¾; wings, 3½—4¾ lin.

The English ♀ specimens correspond to the mutilated example described by Curtis and Haliday; in them the prothorax is either wholly black or only testaceous at the sides; the antennæ are piceous at the base, or testaceous only on the under side of the 2 basal joints; the 2d abdominal segment is rufo-piceous; the wings are not lacteo-hyaline as described by Ruthe: the hind coxæ are fuscous at the base, and the hind legs altogether infuscated. The ♂ (which I have not seen) is similar, according to Ruthe, but the piceous portions of the body are darker; according to Wesmael the humeral angles of the metathorax are testaceous. No doubt the species varies, and a good series is required to exhibit its changes completely. Head as wide as the thorax; palpi, mandibles, and clypeus testaceous, the last broad and depressed. Antennæ of the ♀ stout, filiform, half as long as the body, 22—27-jointed; those of the ♂ setaceous, longer than the body, 35-jointed. Metathorax short, not very convex, rugulose, with traces of a medial area and of a longitudinal carina. First abdominal segment rimulose at the sides and apex, punctato-rugulose in the middle, elongate, its apex only twice as wide as the base. Nervures of the wings very fine: cubital and anal nervures hardly visible; one ♀ in Fitch's collection wants the 2d intercubital in both fore wings.

Described from 11 females in Fitch's collection, mostly taken by him at Maldon in June and July; three marked "Huddersfield" were bred by Porritt, but it is not stated from what larva: three females sent to Bridgman by W. H. B. Fletcher were found in old birds'-nests containing several different insects.

Obs. Nees v. Esenbeck has referred to this species the *Bracon cis* of Bouché, bred from the larvæ of *Cis boleti*, Scop. (Mon., ii., 399); but the small size of the beetle renders this impossible. See *M. profligator*, Hal., sp. 26, *infra*.

15. *Meteorus albicornis*, Ruthe.

Perilitus brevipes, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 33, ♂; not of his Supplement, *lib. cit.*, 1838, p. 141, ♀.

Meteorus brevipes, Ruthe, Berl. ent. Zeits., 1862, p. 35, ♂.

M. albicornis, Ruthe, *lib. cit.*, p. 34, ♀.

Black; antennæ ♀ white tipped with fuscous; mouth and legs dull rufo-testaceous; 2d abdominal segment piceous. Wings small, especially of the ♀, infuscated, with a whitish streak under the stigma; squamulæ testaceous; nervures and stigma fuscous, the latter hyaline at the inner angle; 2d abscissa of the radius obsolete; recurrent nervure rejected; 2d cubital areolet subtriangular, much narrowed towards the radius. Metathorax gibbous, coarsely rugose. Legs stout, short. Tracheal grooves distinct. Terebra less than $\frac{1}{5}$ of the length of the abdomen. ♂ ♀. Length, 2; wings, $3\frac{3}{4}$ lin.

Head very little narrower than the thorax; vertex short; cheeks produced below the eyes; face almost twice as broad as long, carinated in the middle, punctulate; mandibles tipped with fuscous; palpi short, dull testaceous. Antennæ of the ♀ stouter than in any other species, rather shorter than the body, filiform, 32-jointed, joints 3—15 yellowish white, the following joints blackish; two basal joints piceous; those of the ♂ $\frac{1}{4}$ longer than the body, setaceous, 33—36-jointed, blackish, piceous towards the base. Thorax stout, coarsely sculptured, the præscutellar fovea longer than usual, whence the scutellum itself appears small. Sides of the prothorax and furrow of the mesopleuræ rugoso-punctate. Metathorax subelongate, gibbous, somewhat excavated behind, coarsely and irregularly reticulato-rugose. Abdomen about as long as the head and thorax, and in the middle as broad as the latter;

segment 1 forming less than ½ of its entire length, gradually widened from the base to the apex, the latter of which is about 4 times as wide as the former, regularly and deeply striated; tracheal grooves large; segment 2 more or less piceous or testaceous anteriorly, darker behind, sometimes entirely black. Terebra shorter than in any other species, the valves slender, whitish, piceous at the base. Wings short, reaching very little beyond the abdomen; those of the ♀ are also narrow; radial areolet small; 2d abscissa of the radius nearly extinct, the 3d abscissa being connected with the 1st by a short sudden curve.

Wesmael discovered the ♂ near Brussels, and obtained seven specimens; afterwards he described what he supposed to be the ♀, in his Supplement, but this is a different species, having the terebra elongate, &c., and probably the ♀ of *brunnipes*, Ruthe. The *brevipes* of Wesmael being thus made up of two different species, I have discarded the name in favour of *albicornis*, Ruthe. Ruthe possessed 26 males of Wesmael's *brevipes* collected near Berlin; and some years afterwards detected two females near the same place, which he described as *albicornis*, hesitating to join them with *brevipes*, on account of Wesmael's mistake, though well aware of their affinity to that species. Accident threw both sexes in my way at the same time, before I had read Ruthe's monograph; of their identity I never had any doubt, and the question may be regarded as settled.

Described from one female, six males, in the collections of Fitch, Bignell, and in my own. Two males are from Devonshire; the rest, with the female, I found near St. Albans.

16. *Meteorus abdominator*, Nees. (Pl. V., fig. 9).

Bracon abdominator, Nees, Mag. Ges. Berl., 1811, p. 24, ♀.

Perilitus abdominator, Nees, Mon., i., 115, ♀; Wesm., Nouv. Mem. Ac. Brux., 1835, p. 47, pl. i., f. 5 (wing), ♂ ♀.

Meteorus abdominator, Hal., Ent. Mag., iii., 27; Ruthe, Berl. ent. Zeits., 1862, p. 38, ♂ ♀; S. v. Voll., Pinac., pl. xliv., f. 5, ♂.

Black; palpi pale fuscous; basal half of the flagellum in the ♀ sometimes, mandibles, 2d abdominal segment, and legs, more or less clear rufous; hind femora and tibiæ black at the apex. Wings

infumated, with a whitish streak under the stigma; squamulæ rufous; nervures stout, fuscous, rufo-testaceous at the base of the wing; stigma fuscous, its inner angle rufous; recurrent nervure rejected; 2d cubital areolet narrowed towards the radius; 2d abscissa of the radius distinct. Metathorax convex, coarsely rugose. Tracheal grooves distinct. Legs stout. Terebra longer than ½ the abdomen. ♂ ♀. Length, 2—2¾; wings, 3½—4⅓ lin.

Head as broad as the thorax; face almost twice as wide as long, not narrower below, not carinated, punctulate; above the clypeus is a shining oval protuberance; mandibles tipped with fuscous. Antennæ ♀ ⅔ of the length of the body, filiform, 22—25-jointed; of the ♂ longer than the body, setaceous, 28—32-jointed, not paler at the base of the flagellum. Thorax less robust than in the last species, coarsely sculptured, the præscutellar fovea large and deep, bisected by a carina. Sides of the prothorax gibbous, rugose, as is also the furrow of the mesopleuræ. Metathorax not elongate, regularly convex, somewhat excavated behind, coarsely and irregularly reticulato-rugose. Abdomen as long as the head and thorax, more attenuated behind than in *albicornis*, segment 2 more brightly rufous; segment 1 about ¼ of the whole length of the abdomen, widened suddenly at the tubercles and thence more gradually to the apex, which is about 4 times wider than the base, striolated; tracheal grooves elongate, conspicuous; segment 2 seldom entirely black, rufous at least anteriorly, even in the ♂; segment 3 also sometimes rufescent at the base. Terebra exceeding ½ or ⅔ of the abdomen; the valves black. The infumated wings are rather narrow in both sexes, and reach but little beyond the anus; 2d cubital narrowed towards the radius, but not so much as to destroy the 2d abscissa. Hind tarsi entirely, the others at the apex, fuscous.

Described from ten females, three males. Common. Taken at Maldon by Fitch; by Thurless near Norwich; by Capron near Guildford; by me in Birch Wood, near St. Albans, Abergavenny, Teignmouth, &c. According to Haliday frequent in Ireland.

17. *Meteorus micropterus*, Hal.

Meteorus micropterus, Hal., Ent. Mag., iii., 27, ♂ ♀.

Head, thorax, 1st abdominal segment, and hind coxæ, black; mouth, antennæ, legs, and the rest of the abdomen, piceous; or the abdomen black with only segment 2 piceous; ♂ often entirely black, with piceous legs. Wings narrow, hardly longer

than the abdomen, infumated, with a whitish streak beneath the fuscous stigma; squamulæ and nervures piceous; recurrent nervure rejected; 2d cubital areolet narrowed towards the radius, of which the 2d abscissa is as long as the 1st. Tracheal grooves obsolete. Terebra longer than ½ the abdomen. ♂ ♀. Length, 1½—2½; wings, 2⅓ – 4 lin.

Head broader than the thorax; face gibbous; eyes small; palpi short. Antennæ ♀ as long as the head and thorax, stout, submoniliform, piceous or subferruginous, darker at the apex, 23—25-jointed; those of the ♂ similar but 24—27-jointed, not much shorter than the body. Thorax subcompressed. Metathorax finely reticulato-rugose. First abdominal segment narrow, curved, with medial tubercles, behind which it is very slightly dilated to the apex, which is rather more than 3 times wider than the petiole; almost smooth, or sparingly exarated; the rest of the abdomen, or only the 2d segment, piceous or subferruginous: belly compressed, truncated behind. The wings of the ♂ are less narrowed and abbreviated than those of the ♀, which are probably too small for flight.

The species is nearly akin to *brunnipes*, Ruthe, also short-winged, but differing in the possession of distinct tracheal grooves, slender legs, &c.; the same characters distinguish the preceding species from *micropterus*, but the two are nearly allied.

Described from two females, four males. Fitch has taken the ♀ at Maldon. The rest are from the Yorkshire moors near Scarborough. The species has not been noticed on the Continent.

18. *Meteorus pulchricornis*, Wesm.

Perilitus pulchricornis, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 42, ♂ ♀.

Meteorus pulchricornis, Ruthe, Berl. ent. Zeits., 1862, p. 40, ♀.

Rufo-testaceous, variable; face, prothorax, and legs flavo-testaceous; femora and tibiæ rufescent, in the hind pair tipped with black; antennæ after the 2d joint testaceous, becoming gradually darker towards the apex; disk of the metathorax, 1st abdominal segment always, 3d and 4th generally, black. Wings hyaline; squamulæ rufo-testaceous; stigma fuscous, with a pale anterior margin; nervures pale fuscous, testaceous at the base; recurrent nervure subinterstitial; 2d cubital areolet slightly narrowed towards

the radius. Thorax broad, robust: metathorax as wide as the mesothorax. First abdominal segment much dilated posteriorly. Tracheal grooves distinct. Hind coxæ punctulato-rugulose. Terebra about equal to $\frac{2}{3}$ of the abdomen. ♂ ♀. Length, 2—$2\frac{3}{4}$; wings, $3\frac{1}{4}$—$4\frac{3}{4}$ lin.

Var. *α*. Posterior segments of the abdomen rufous or testaceous, with or without a black common patch on the disk. ♂ ♀. Common.

Var. *β*. Entirely black above except the face, orbits, scutellum, and 2d abdominal segment; this last is nearly filled up by a transverse fuscous fascia. Two males.

Var. *γ*. Like the last, but the sutures and central space of the mesothorax are rufous. One male.

Var. *δ*. Occiput black; mesothorax rufous with black sutures; metathorax rufous at the sides. One male.

Var. *ε*. Metathorax and tips of the hind femora slightly infuscated; abdomen rufo-testaceous, 2d segment flavo-testaceous. Wesmael.

Head narrower than the large gibbous thorax; face subquadrate, somewhat rugulose transversely. Mandibles and palpi flavo-testaceous. Antennæ ♂ ♀ filiform, 29—31-jointed; in the ♀ as long as the body, testaceous nearly to the middle, each joint annulated with fuscous, thence to the apex gradually darkened; in the ♂ longer than the body, the flagellum to a greater extent, or entirely, fuscous. Mesothoracic lobes prominent, forming (as seen from above) with the scutellum, 4 equidistant shining tuberosities; præscutellar fovea crenate. Furrow of the mesopleuræ broad, shallow, rugoso-punctate. Metathorax broader than usual, convex, densely reticulato-rugose, abruptly sloping behind, and there excavated. Abdomen as long as the head and thorax, and at its widest part somewhat narrower than the latter; segment 1 forming more than $\frac{2}{3}$ of its entire length; tubercles post-medial; regularly striated; petiole dilated at the extreme base, and often rufous; it begins to dilate again before the tubercles, and is gradually widened to the apex, which is about 4 times wider than the base; tracheal grooves large and deep. Stigma dark brown, margined with pale colour on its costal edge, and with its two angles paler; but the border is sometimes confused more or less with the fuscous disk. Ground colour of coxæ and legs flavo-testaceous; femora and tibiæ rufescent in the middle; tarsi pale; claws fuscous.

Described from 18 females, 24 males. A common species, and singularly omitted by Haliday, unless perhaps it is included in some of his varieties of *pendulator*

(Ent. Mag., iii., 29), especially vars. ε, ζ, from the banks of the Shannon. The specimens used by me, 42 in number, are mostly in Fitch's and Bignell's collections, and many of them have been bred. Bignell has obtained them from *Agrotis agathina*, Dup., several out of the same larva; from *Agrotis strigula*, Thunb., May 10th; *Tæniocampa stabilis*, View.; *Hibernia leucophæria*, Schiff.; *Anisopteryx æscularia*, Schiff.; *Cheimatobia brumata*, L.; *Oporabia dilutata*, Bork.; and *Harpella Geoffroyella*, L. Bridgman reared one from *Scoparia truncicolella*, Staint.; and three came from a geometrical larva in my keeping, the name of which I did not ascertain; one of the cocoons thus obtained produced the hyperparasite *Mesochorus confusus*, Holmgr. It appears that two, three, or four of these *Meteori* infest the same caterpillar, if it be large enough; in other cases they are solitary. Cocoon like that of *ictericus* (sp. 6), pensile, greyish brown and glistening, as if varnished.

19. *Meteorus melanostictus*, Capron, MS., n. s.

Nigro-piceus; prothoracis latera cum capite *feminæ* rufo-testacea, stemmatico, occipite, nigricantibus; *maris* caput nigro-piceum; orbitæ plus minus, prothoracis latera cum pectore toto, nonnunquam etiam cum scutelli apice, rufo-testacea. Pedes testacei, tibiis posticis apice et ante basin fuscis, basi ipsa exalbida, tarsis fuscis. Alæ subhyalinæ; squamulæ testaceæ; stigma unicolor cum nervis nigro-piceum; nervus recurrens *feminæ* plane evectus, *maris* plerumque interstitialis, rarius paulo evectus; areola cubitalis 2da radium versus non angustata. Metathorax convexus, medio carinatus, postice excavatus, intricato-rugosus. Abdominis segmentum 1mum striolatum, apice triplo latius quam basi, tuberculis mediis, fossulis spiracularibus conspicuis. Terebra abdominis dimidio brevior.

Nigro-piceous; head and sides of prothorax in the ♀ rufo-testaceous, stemmaticum and occiput piceous; head of the ♂ nigro-piceous, the orbits more or less, sides of prothorax, pectus, and sometimes apex of scutellum, rufo-testaceous; legs testaceous; hind tibiæ fuscous at the apex and faintly before the base, which is whitish; tarsi fuscous. Wings subhyaline; squamulæ testaceous; stigma unicolorous, and, with the nervures, nigro-piceous; recurrent nervure of the ♀ distinctly evected, of the ♂ interstitial, in one example only evected; 2d cubital areolet not narrowed towards the radius. Metathorax convex, carinated in the middle, excavated

posteriorly, intricato-rugose. First abdominal segment striolated, 3 times wider at the apex than at the base; tubercles medial; tracheal grooves distinct. Terebra shorter than $\frac{1}{2}$ the abdomen. ♂ ♀. Length, $2\frac{1}{2}$; wings, 5 lin.

Head transverse, slightly contracted behind the eyes. Antennæ nearly filiform in both sexes; in the ♂ longer than the body, 34—35-jointed; in the ♀ about as long as the body, 25—28-jointed, the two basal joints testaceous. Palpi pale. The whole under side of the thorax is testaceous, except the pectus of my ♀ specimen; this character, as well as the rufous scutellum of one example, and the general structure of all, brings the species very near to *scutellator* (sp. 20); the differences, however, are obvious; in *melanostictus* the stigma is uniformly blackish; the recurrent nervure in Capron's specimens of the ♀, and in one of my males, is distinctly evected; in the other males it is interstitial, as in *scutellator*. The direction of the recurrent nervure is not constant in the different species, and causes a difficulty in determining their limits; but it is at most only a secondary character.

Described from three females, five males. The description of the ♀ was communicated by Capron, to which I have added what relates to the other sex. The females were taken at Shiere, the males at Nunton, but there is no doubt that they belong to the same species, and that the species is new.

20. *Meteorus scutellator*, Nees.

Perilitus scutellator, Nees, Mon., i., 38; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 39, ♂ ♀.
Meteorus scutellator, Ruthe, Berl. ent. Zeits., 1862, p. 41, ♂ ♀; S. v. Voll., Pinac., pl. xliv., f. 8, ♀.

Black; palpi pale; face, clypeus, mandibles, antennæ at the base beneath, more broadly in the ♀, orbits of the eyes sometimes, pleuræ, pectus, scutellum and 2d abdominal segment, rufo-testaceous; mesopleuræ sometimes blackish in front; hind tibiæ and tarsi more or less infuscated at the apex. Wings hyaline; squamulæ and stigma yellow; nervures flavo-fuscous; recurrent nervure interstitial; 2d cubital areolet scarcely narrowed towards the radius. Tracheal grooves small, distinct. Terebra as long as $\frac{2}{3}$ of the abdomen. ♂ ♀. Length, 2—$2\frac{3}{4}$; wings, $4\frac{1}{3}$—6 lin.

Var. Rufous; metathorax black; 1st abdominal segment piceous towards the apex; stigma rufo-fulvous. One male in Fitch's collection.

Somewhat variable. Prothorax usually testaceous, the neck blackish, seldom entirely pale; sometimes black at the sides, and margined above with rufous. Disk of the mesothorax from black passing into piceous and testaceous; scutellum, pleuræ, and pectus rufo-testaceous. Metathorax black, but with a more or less rufous triangular patch above the hind coxæ, sometimes overspreading the whole disk except the middle. Segment 2 paler than the pleuræ: the following segments seldom concolorous, usually more or less blackened, especially in the ♂. Belly rufo-testaceous or piceous, in various shades. Head rather narrower than the thorax; face flat, quadrate; clypeus convex. Antennæ ♀ as long as the body, subsetaceous, 33—35-jointed; of the ♂ much longer, also subsetaceous, 35-jointed; entirely fuscous, or the 2 basal joints in the ♂ and more in the ♀ are testaceous underneath. Furrow of the mesopleuræ shining, smooth, finely crenulate at the base. Metathorax not very convex, finely reticulato-rugose, with a medial carina. First abdominal segment regularly striolated, more than ⅓ of the abdomen in length, gradually widened from the post-medial tubercles to the apex, which is 3 times broader than the base; tracheal grooves comparatively minute. The stigma is sometimes infuscated on its inner margin, and rarely altogether of a darker colour; the recurrent nervure is usually interstitial, but sometimes deviates slightly to one side or the other.

Described from seven females, four males. Common. In Fitch's collection are a ♂ ♀ bred by him and Bignell from *Tæniocampa stabilis*, View. Bignell and Hellins bred it from *Scopelosoma satellitia*, L.; and Bignell others from *Noctua triangulum*, Hufn., *Calymnia trapezina*, L., and *Ocneria dispar*, L.; the last-mentioned larva was from Switzerland. Cocoon pensile, exactly like that of *pulchricornis* and *ictericus*, only larger.

21. *Meteorus unicolor*, Wesm. (Pl. V., fig. 10).

Perilitus unicolor, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 41, ♂ ♀; not of Ratz., i., 76, ii., 56.

Meteorus unicolor, Ruthe, Berl. ent. Zeits., 1862, p. 43, ♂ ♀.

Testaceous with hardly a rufous tinge; antennæ fuscous beyond the middle, and all the articulations ringed with the same colour; 1st abdominal segment piceous, paler at the base; tarsi pale; claws fuscous. Wings hyaline, squamulæ, stigma, and nervures at the base yellow, the rest of the neuration fuscescent; recurrent nervure interstitial; 2d cubital areolet subquadrate, not narrowed

towards the radius. Tracheal grooves distinct. Terebra equal to ½ or ⅔ of the abdomen. ♂ ♀. Length, 2½; wings, 5 lin.

Apart from the colour there is little to distinguish this from the last species. It is, however, somewhat smaller, the antennæ are longer, and their basal half is always pale; those of the ♀ are 32—34-jointed; those of the ♂ 29- (in one British example), in that adduced by Ruthe 33-jointed. Metathorax regularly rounded, reticulato-rugulose, with or without a medial carina. First segment forming nearly ½ of the entire length of the abdomen, regularly striolated.

Described from one male, five females, in the collections of Fitch and Bignell; the former has taken the ♀ at Maldon; the latter bred the ♂, June 28th, from *Tethea retusa*, L., and the remaining females also in June from *Orthosia lota*, Clerck.

22. *Meteorus consors*, Ruthe.

Meteorus consors, Ruthe, Berl. ent. Zeits., 1862, p. 44, ♀.

Rufo-testaceous, face and legs paler; vertex, occiput, 3 bands on the lobes of the mesothorax, metathorax, pectus, and 1st abdominal segment blackish; antennæ except the base, hind femora and tibiæ at the tips, with their tarsi, fuscescent. Wings hyaline; squamulæ testaceous; nervures fuscescent; stigma flavo-testaceous, its outer lower half indeterminately fuscous; recurrent nervure interstitial or subinterstitial; 2d cubital areolet hardly narrowed towards the radius. Tracheal grooves distinct. Terebra as long as the abdomen. ♀. Length, 2¼; wings, 4¼ lin.

Head a little narrower than the thorax, black above and on the occiput; face and mouth rufo-testaceous; palpi whitish. Antennæ nearly as long as the body, filiform, 31—34-jointed, fuscous, paler beneath, joints 1—2 dull testaceous. Ground colour of the thorax testaceous; according to Ruthe only the metathorax and postscutellum, occasionally also the middle lobe of the mesothorax, are infuscated; but in British examples the 3 mesothoracic lobes, pleuræ, and pectus are often blackish. Metathorax somewhat elongate, reticulato-rugulose, slightly excavated behind. Abdomen slender, at its broadest part narrower than the thorax; segment 1 a little shorter than all the rest taken together, black, rimulose, with a short petiole and inconspicuous tubercles, behind which it is insensibly dilated to the apex, this last being 3 times wider than the petiole; the remaining segments are either wholly testaceous

or slightly infuscated at the sutures. Between the tracheal grooves is an elevated ridge. Hind coxæ, femora, and tibiæ sometimes rufescent.

Described from seven females. In Fitch's collection are several specimens bred from *Bryotropha domestica*, Haw.; and I have captured two others, one at St. Albans, and the other at Nunton, Wilts.

23. *Meteorus versicolor*, Wesm.

Perilitus versicolor, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 43, ♂ ♀.
Meteorus versicolor, Ruthe, Berl. ent. Zeits., 1862, p. 45, ♂ ♀; S. v. Voll., Pinac., pl. xliv., f. 6, ♀.
Perilitus bimaculatus, Wesm., *lib. cit.*, p. 45, ♀; *Meteorus bimaculatus*, Ruthe, *lib. cit.*, p. 47, ♀.

Variable. Rufous; metathorax and abdomen black; petiole and 1st abdominal suture whitish; base of antennæ, face, mouth, prothorax, humeral angles of the mesothorax, a variable patch on segments 2—3 in the ♂, anus, and legs flavo-testaceous; hind coxæ, with their femora and tibiæ, more or less blackish, these femora and tibiæ whitish at the base. Wings hyaline, squamulæ testaceous, stigma yellow or fuscous, nervures fuscescent; recurrent nervure interstitial, sometimes slightly rejected; 2d cubital areolet subquadrate, not narrowed towards the radius. Tracheal grooves obsolete. Terebra about ½ as long as the abdomen. ♂ ♀. Length, 2—2½; wings, 4—5 lin.

The typical form may be known by the jet-black abdomen, spotted with yellowish white, the whitish petiole, and the absence of the tracheal grooves; also by the white 1st abdominal suture of the ♀.

Var. *α*. ♂. Head and thorax rufous; metathorax black above; hind coxæ rufous; legs flavo-testaceous. Abdomen with a whitish petiole; hind margin of segment 1, 2 triangular transverse fascia on segments 2—3, united by a longitudinal stripe in the middle, yellowish white. In Wesmael's collection.

Var. *β*. ♀. Head black; mesothorax and scutellum rufous; abdomen black, except the petiole and the 1st suture, which are yellowish white. Hind coxæ, femora, and tibiæ black, the last broadly white at the base, the femora more narrowly. Bred by Bignell.

Var. *γ*. ♀. Rufo-testaceous; metathorax more or less infuscated; 1st abdominal segment with a whitish petiole, and marked before the apex with 2 blackish confluent spots; hind femora and tibiæ

tipped with fuscous; recurrent nervure subinterstitial. *M. bimaculatus*, Wesm.

Var. δ. ♀. First abdominal segment not whitish at the base; hind femora and coxæ rufous. Taken by Capron.

The typical form has the head rufo-testaceous; face yellowish; antennæ fuscous, testaceous towards the base; palpi whitish; thorax rufo-testaceous, sides of the prothorax paler; metathorax rufous, more or less black above, or entirely black; 1st abdominal segment whitish nearly to the tubercles, afterwards jet-black with a white hind margin; 2d segment either yellow, with 2 lateral black spots varying in size in the ♂; or in the ♀ entirely black from the coalescence of the spots, which leave only the fore margin narrowly yellow; segment 3 (connate with 2) black in the ♀, or only the suturiform articulation is pale; the following segments are entirely black, or the apex of the abdomen, with the belly, more or less testaceous. Stigma pale, or the inner margin brown, and that colour more or less diffused over the disk. Legs either wholly testaceous, or the femora and tibiæ of the hind pair blackened, except at the base; hind coxæ fuscous at the base.

Head narrower than the thorax; face flat, quadrate; eyes and ocelli prominent; cheeks narrow. Antennæ setaceous, as long as the body, and nearly equal in both sexes, 29—30-jointed in the ♀, 32-jointed in the ♂. Metathorax short, reticulato-rugulose, the posterior declivity in the ♀ distinct and margined above; less conspicuous in the ♂; somewhat excavated behind. Abdomen hardly longer than the head and thorax, at its broadest part not narrower than the latter; segment 1 occupying almost ½ of the entire length, curved at the end of the petiole, which is smooth; from thence gradually dilated to the apex, and striolated; the apex less than 4 times wider than the base. Tracheal grooves none. Terebra about ½ as long as the abdomen; Wesmael, according to his usual practice, makes it longer, and equal to the whole abdomen.

Described from a pair, of which the ♀ is British; the ♂ is preserved in one of Wesmael's boxes sent to me from Brussels, and containing all the Braconids of the Musée Royal, except Wesmael's types. In the same boxes are several specimens of *M. bimaculatus*, Wesm.; and I find three more in the Hungarian collection of Dr. Cornelius Chyzer: one of these has the metathorax infuscated; their cocoons are paler than those of the typically coloured examples. Capron has twice taken the ♀ at Shiere; Bignell bred the same sex from *Geometra papilionaria*, L. Reinhard, in a note appended

to Ruthe's description (*lib. cit.*, p. 46), records the rearing by himself in two successive years of about 100 of *M. versicolor* from the larvæ of *Laria L-nigrum*, Müll. About a fifth part of them had the recurrent nervure rejected, as in Bignell's specimen, but not in Wesmael's. The second generation was not so highly coloured as the first, corresponding to Ruthe's description rather than to that of Wesmael. The latter writer mentions that in June, 1831, he found two caterpillars of *Asteroscopus sphinx*, Hufn., on a lime-tree near Charleroi, which produced a number of these parasites. They made oval brown cocoons about 2 lines long, irregularly heaped together, and connected by threads of silk. In this case the cocoons were evidently not suspended by a thread; but that of Bignell's specimen, produced singly, is pensile, resembling the cocoons of *ictericus*, except in being of a darker colour. Van Vollenhoven mentions the capture of this species near the Hague, and Leyden; he has figured one of the specimens. Ruthe possessed four males, two females, from the neighbourhood of Berlin.

24. *Meteorus filator*, Hal.

Meteorus filator, Hal., Ent. Mag., iii., 32, ♂ ♀.
Perilitus laticeps, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 47, ♀.
Meteorus laticeps, Ruthe, Berl. ent. Zeits., 1862, p. 49, ♀.

Black; palpi whitish; face, clypeus, mandibles, and sides of the prothorax partly, dull testaceous; legs, and (in the ♀) the base of the antennæ, rufo-testaceous; hind femora and tibiæ sometimes infuscated. Wings hyaline; squamulæ testaceous; nervures fuscescent; stigma fuscous, its inner angle paler; recurrent nervure subrejected; 2d cubital areolet not narrowed towards the radius. First abdominal segment elongate, with a linear, slender petiole; reticulato-rugulose, with arcuate striæ on each side of the suddenly dilated condylus; tracheal grooves obsolete. Terebra curved, as long as the abdomen. ♂ ♀. Length, $2\frac{1}{4}$—$2\frac{1}{3}$; wings, 4—$4\frac{3}{4}$ lin.

Distinguished from the other black species by the elongate petiole, and absence of the tracheal grooves; also, in the female sex, by the short antennæ. Head large, broader than the thorax; eyes large, prominent; ocelli small; face subquadrate, not carinated, sparingly punctured. Antennæ of the ♀ scarcely longer than the

head and thorax, stout, filiform, 23—24-jointed, testaceous, the apical fourth part, or more, fuscous; 8 ante-apical joints subquadrate; those of the ♂ setaceous, longer than the body, 28—31-jointed, entirely fuscous, or with the extreme base pale. Prothorax above and on the sides sometimes more or less rufescent. Metathorax rather short, obliquely subtruncate behind, finely and irregularly rugulose, indistinctly divided into 2 discal areæ by 3 carinæ. First abdominal segment almost as long as the rest taken together; tubercles not salient; petiole and condylus reticulato-rugulose, the latter towards the apex with some additional lateral curved striæ. Segment 2 sometimes piceous at the base. Valves of the terebra brown, darker at the apex. Hind coxæ sometimes infuscated at the base; their femora and tibiæ at the apex, with the tarsi, slightly infuscated. Recurrent nervure inserted into the extreme apex of the 1st cubital areolet.

Described from one female, four males. Not uncommon. Taken by Bignell in Devonshire; by me in South Wales and Wiltshire. Wesmael possessed only one ♀, and Ruthe two. According to Haliday the ♀ occurs amongst fungi in autumn; it probably has the same habits as *obfuscatus*, Nees (sp. 11). Common at Shiere, near Guildford: "I have taken," says Capron, *in litt.*, "many females of this species by shaking pieces of *Polyporus versicolor*. They were in a semi-torpid condition, and fell from the fungus with their legs doubled up, and feigned death; the males were abundant in the autumn by sweeping."

25. *Meteorus delator*, Hal.

Meteorus delator, Hal., Ent. Mag., iii., 33, ♀.

"Black, shining; mouth, antennæ at the base beneath, and legs, ferruginous, the posterior infuscated; segment 1 obconic, elongate and attenuated at the base; stigma fuscous with a pale spot; terebra as long as the abdomen. ♀. Length, $1\frac{1}{2}$; wings, $2\frac{3}{5}$ lin.

"Very like *filator*, but readily distinguished by the form of the petiole, which is shorter than that of *cinctellus* (sp. 27), and sculptured as in the preceding species; segment 2 piceous; posterior legs fuscescent, the base of the articulations paler; antennæ slender, 23-jointed, obscurely ferruginous at the base beneath.

"Inhabits with the preceding, but is much rarer." Haliday.

26. *Meteorus profligator*, Hal.

Meteorus profligator, Hal., Ent. Mag., iii., 33, ♀.
Bracon cis, Bouché, Naturg. (1834), p. 149.

Black; abdominal segment 2, or all after the 1st, nigro-piceous; antennæ fuscous, their base and the legs testaceous. Wings hyaline; squamulæ testaceous; nervures fuscescent; stigma fuscous, its inner angle broadly and indeterminately pale; recurrent nervure slightly rejected; 2d cubital areolet not narrowed towards the radius. First abdominal segment short; the rest of the abdomen ovate, as broad as the thorax. Tracheal grooves obsolete. Terebra nearly as long as the abdomen. ♀. Length, 1¼; wings, 2½ lin.

Head large, wider than the thorax; palpi pale. Antennæ filiform, shorter than the body, 20—21-jointed, the last 8 joints subquadrate. Metathorax short, reticulato-rugulose. First abdominal segment with a broad, short petiole, tubercles and tracheal grooves obsolete; insensibly dilated nearly from the base to the apex, which is 4 times broader than the petiole, irregularly rugulose; extreme base of the petiole subdilated and pale.

Haliday's descriptions of *delator*, *vexator*, *profligator*, and *jaculator* are incomplete, and it is necessary to possess them all, in order to determine any one with certainty. The present species he compares with *delator*, of which no specimens are now known. It is said to be nearly akin to *delator* but smaller, with a shorter prothorax and metathorax; 1st abdominal segment coarctate near the base, not linear; *delator* has 23-jointed antennæ; the specimens before me have them 21-jointed, and are therefore most probably *profligator*.

Bignell bred eight or nine females from *Cis boleti*, Scop., in *Polyporus versicolor*. Hence it may be inferred with something like certainty that this is the *Bracon cis* of Bouché, reared from the same beetle, and not *M. atrator*, as conjectured by Nees v. Esenbeck, which is much too large an insect (see sp. 14). According to Bouché the parasitic maggot is oblong, rugose, white, with a rounded head, and the parts of the mouth blackish. Capron has taken a ♀ at Shiere.

27. *Meteorus cinctellus*, Nees.

Bracon cinctellus, Nees, Mag. Ges. Berl., 1811, p. 23, ♀; not of Spinola.

Perilitus cinctellus, Nees, Mon., i., 40, ♂ ♀; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 50, ♀.

Meteorus cinctellus, Hal., Ent. Mag., iii., 31, ♀; Ruthe, Berl. ent. Zeits., 1862, p. 50, ♀.

Black; face, mouth, orbits, disk of the mesothorax partly, 2d abdominal segment, and legs testaceous; hind femora and tibiæ fuscescent at the apex; antennæ fuscous, those of the ♀ broadly testaceous in the middle. Wings of the ♂ subinfuscated, of the ♀ more hyaline; squamulæ testaceous; nervures fuscescent; stigma fuscous, its base more or less pale; recurrent nervure evected, but sometimes interstitial; 2d cubital areolet slightly narrowed towards the radius. Tracheal grooves obsolete. Terebra about $\frac{2}{3}$ of the abdomen. ♂ ♀. Length, 2—2¼; wings, 3½—4 lin.

Var. ♀. Length, 1½ lin. Hind coxæ almost entirely black; 2d abdominal segment and antennæ obscurely testaceous. Ruthe.

Head narrower than the thorax, rufo-testaceous; front and vertex in the middle, as well as the occiput, black, leaving the orbits rufous, most broadly upon the vertex; eyes large; face narrow; clypeus prominent; palpi whitish at the tips. Antennæ of the ♀ filiform, flagellum testaceous for about half its length, thence gradually darkened to the apex, ¼ shorter than the body, 25—27-jointed; those of the ♂ setaceous, fuscous, the scape paler, much longer than the body, 28—30-jointed. Thorax black, but the disk of the mesothorax in the sutures and the medial space usually more or less rufescent; pleuræ and scutellum sometimes also rufescent. Metathorax subelongate, obliquely descending behind, thickly and finely rugulose. Abdomen of the ♀ somewhat longer than the head and thorax, of the ♂ shorter; segment 1 hardly equal to ⅔ of its length, of which the petiole makes ⅓, and is smooth and shining; condylus rimulose, dilated from the inconspicuous tubercles to the apex, which is about 3 times the width of the petiole; segment 2 flavo-testaceous on its anterior or posterior half, or on both; remaining segments black, or the posterior more or less flavo-piceous. Wings of the ♂ slightly coloured, yet enough to show sometimes a whitish streak beneath the stigma; those of the ♀ nearly hyaline. In the British specimens which I have seen the recurrent nervure is uniformly evected, but according to Ruthe it is often interstitial. Hind coxæ at the base, hind femora and tibiæ at the apex, often broadly fuscous. The ♂ strongly resembles that of *punctiventris* (sp. 12), especially when the rufous colour of

the orbits is deficient; but the presence of the tracheal grooves on the 1st segment will distinguish *punctiventris*.

Perilitus cinctellus, Bouché (Naturg., 1884, p. 149) is inadequately described, but Nees refers it to this species, with what degree of certainty I know not. Bouché's insect is a parasite of *Tortrix viridana*, L., and makes a "snow-white" cocoon: it was known to Ratzeburg, like all Bouché's insects, but he is silent as to its identity with the *cinctellus* of Nees.

Described from two males, four females, captured in Devonshire and South Wales. Not common: found by Haliday in North Ireland, and, besides the authors above cited, mentioned by Van Vollenhoven as taken at Middelburg. Capron has captured two females at Shiere.

28. *Meteorus tenellus*, n. s.

Niger, facie, ore, genis, verticis macula orbitali utrinque, antennarum basi subtus, pedibusque, rufo-testaceis; abdominis cingulo medio anoque flavidis. Alæ hyalinæ squamulis testaceis, nervis cum stigmate fuscis, hujus basi indeterminate pallida; nervo recurrente vix evecto; areola cubitali 2da radium versus parum angustata. Fossulæ tracheales nullæ. Abdominis segmentum 1mum petiolo elongato tereti lævigato, condylo rimuloso. Terebra abdominis dimidii longitudine.

Black; face, mouth, cheeks, an orbital spot on each side of the vertex, antennæ at the base beneath, and legs, rufo-testaceous; a medial fascia on the abdomen, and the anus, yellow. Wings hyaline; squamulæ testaceous; nervures and stigma fuscous; the base of the latter indeterminately pale: recurrent nervure hardly evected; 2d cubital areolet very slightly narrowed towards the radius. Tracheal grooves obsolete. Petiole of the 1st abdominal segment elongate, smooth, cylindrical; condylus rimulose. Terebra as long as ½ the abdomen. ♀. Length. 1½; wings, 2¾ lin.

Head somewhat narrower than the thorax, rufo-testaceous; front, vertex, and occiput black, leaving two large orbital spots and the cheeks broadly, rufous. Face subquadrate; eyes not approximating in front; clypeus smooth, prominent; palpi testaceous. Antennæ filiform, very little shorter than the body, blackish, rufescent at the base and beneath, 27-jointed, the ante-apical joints longer than broad. Thorax black, except sometimes a rufous patch on the mesopleuræ. Metathorax subelongate, thickly and finely rugulose, not carinated, nor excavated behind. Abdomen not

longer than the head and thorax; segment 1 forming $\frac{2}{3}$ of its length, black; petiole equal to half the segment, subcylindrical, smooth, slender; condylus gradually dilated to the apex and finely rimulose; segment 2, and sometimes the base of 3, yellow; the rest black, or those near the apex coloured like the 2d. Wings short, hardly extending beyond the apex of the abdomen. Legs uniformly testaceous, or the hind coxæ rufescent; tarsi fuscous.

This species will only compare with *cinctellus*, Ns., and from that it is easily distinguished. Described from six females bred by Bignell singly from *Peronea hastiana*, L. Cocoons not preserved.

29. *Meteorus leviventris*, Wesm.

Perilitus leviventris, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 46, ♀.
Meteorus lævirentris, Ruthe, Berl. ent. Zeits., 1862, p. 52, ♀.
M. medianus, Ruthe, *lib. cit.*, p. 53, ♂ ♀.
Perilitus rubens, var. β, Nees, Mon., i., 36.
Meteorus rubens, var. γ, Hal., Ent. Mag., iii., 30, ♂ ♀.

Variable; black; mouth, face, orbits, antennæ beneath and at the base, sides of the prothorax, mesothorax in the middle of the disk, scutellum, and legs, dull rufo-testaceous; hind coxæ and 2d abdominal segment piceous. Wings hyaline; squamulæ testaceous; nervures fuscescent; stigma luteous; recurrent nervure interstitial or slightly rejected; 2d cubital areolet somewhat narrowed towards the radius; radial areolet sublanceolate, not reaching the extremity of the wing. First abdominal segment more or less rimulose or lævigated. Tracheal grooves obsolete. Terebra $\frac{1}{2}$ as long as the abdomen. ♂ ♀. Length, $1\frac{3}{4}$—$2\frac{1}{4}$; wings, $3\frac{3}{4}$—$4\frac{3}{4}$ lin.

Var. Front, stemmaticum, middle of the vertex, occiput, 3 patches on the mesothoracic lobes, metathorax, and abdomen, except the piceous 2d segment, black; the rest rufo-testaceous; legs pale testaceous. ♂ ♀. *M. medianus*, Ruthe.

Head somewhat narrower than the thorax; face transverse, flat, not narrowed below, subrugulose in the middle. Palpi pale. Antennæ of the ♀ $\frac{1}{4}$ shorter than the body, fuscous, more or less reddish beneath and towards the base, filiform, 26-jointed; those of the ♂ longer than the body, setaceous, 28-jointed. Metathorax short, semiglobose, reticulato-rugulose, hardly excavated behind. Abdomen in the ♀ as long as the head and thorax, in the ♂ shorter and narrower; segment 1 about $\frac{3}{4}$ of its entire length, with a short

petiole and medial tubercles; usually rimulose except at the base, but often lævigated in different degrees, especially on the condylus; I have specimens in which this segment is almost smooth; they differ in no other respect from the rest, some are intermediate, and it appears to me that *leviventris*, Wesm., and *medianus*, Ruthe, are the same species. Ruthe remarks that the examination of a long series of specimens would very likely show that the next species, *M. rubens*, should also be united with these two. Another allied species is *M. obsoletus*, Wesm. (*lib. cit.*, p. 49), having a longer terebra; but its identity with the present is more doubtful.

Described from four females, one male. Common; taken by me in Kent, Yorkshire, and Leicestershire; by Bignell also in Devonshire.

30. *Meteorus rubens*, Nees.

Bracon rubens, Nees, Mag. Ges. Berl., 1811, p. 22; *Perilitus rubens*, Nees, Mon., i., 36, ♂ ♀.
Meteorus rubens, Hal., Ent. Mag., iii., 30; Ruthe, Berl. ent. Zeits., 1862, p. 54, ♂ ♀.

Rufo-testaceous; antennæ towards the apex fuscous; legs testaceous; metathorax and 1st abdominal segment more or less blackish. Wings as in sp. 29; recurrent nervure interstitial. First abdominal segment rimulose, often more or less lævigated. Tracheal grooves obsolete. Terebra ½ as long as the abdomen. Length, 1½—2¼; wings, 3¼—4¾ lin.

Var. ♂. Third and following abdominal segments black, or with a blackish spot upon the disk.

Head as in the preceding species; antennæ rather shorter and stouter, those of the ♀ 26- (seldom 25- or 27-) jointed, as long as the head, thorax, and 1st abdominal segment; those of the ♂ 28-jointed, longer than the body. The average size is somewhat less than that of *leviventris*, but besides the colour no further means of distinction appear. Head usually rufo-testaceous, unicolorous, or the occiput and stemmaticum fuscous. Thorax rufo-testaceous; metathorax more or less blackened above, or black with a rufous patch on each side. First abdominal segment usually infuscated or black, seldom rufo-testaceous. The males bred by Bignell have the posterior segments more or less black, and the same character appears in the smaller females.

Nees v. Esenbeck and Haliday seem to have regarded this and No. 29 as varieties of the same species;

Wesmael and Ruthe (the latter doubtfully) considered them distinct. It is hard to settle the question even by breeding, for individuals of the same brood are always uniform, while one brood is found to differ slightly from another. It is probable that they all belong to one inconstant species, the leading characters of which are the absence of tracheal grooves, the tendency of the 1st abdominal segment to become smooth, and the habit of gregarious parasitism.

Described from thirteen females, three males. The form known as *rubens* occurs, according to Haliday, on sandy coasts; I have obtained it at Sandwich, and among the roots of rushes at Freshwater Bay, Pembrokeshire, where it was very abundant. But it is equally common at a distance from the sea. Bignell bred two broods from *Agrotis tritici*, L., gregariously, like Microgasters. Their cocoons are irregularly heaped together, and not pensile. The individuals of one batch are larger than those of the other; the latter came out May 31st, to the number of thirteen, and continued in the pupa-state eighteen days.

31. *Meteorus fragilis*, Wesm.

Perilitus fragilis, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 52, ♂ ♀.
Meteorus colon, Hal., Ent. Mag., iii., 30, ♀.
M. fragilis, Ruthe, Berl. ent. Zeits., 1862, p. 55, ♂ ♀.
Perilitus fasciatus, Ratz., Ichn. d. Forst., i., 77, pl. vii., f. 15, ♀.

Black above, beneath flavo-testaceous; face, mouth, orbits, 2d abdominal segment, in the ♂ also the apex of the abdomen, and legs, pale; 2d abdominal segment with 2 indeterminate black spots; scutellum sometimes rufescent. Antennæ fuscous, except the extreme base, long and slender, like the petiole and legs. Wings ample, hyaline; squamulæ and stigma flavo-testaceous; nervures fuscescent; recurrent nervure evected into the 2d cubital areolet, which is prolonged for its reception, and is also much narrowed towards the radius. Tracheal grooves obsolete. Terebra about ½ the abdomen. ♂ ♀. Length, 2—2¼; wings, 4—4½ lin.

Head not narrower than the thorax. Palpi whitish. Antennæ setaceous, fuscous, or fusco-testaceous, becoming darker after the base; those of the ♀ longer than the body, 31—32-jointed; of the

♂ half as long again as the body, 31—36-jointed. Disk of the thorax entirely black, or sometimes piceous; scutellum, or its apex, with the neighbouring sutures, rufescent. Mesopleuræ rufo-testaceous, beneath the wings blackish. Metathorax sloping gradually behind, scabriculous, the posterior declivity ill-defined. First abdominal segment elongate, with medial inconspicuous tubercles, from whence to the apex it is slightly and gradually dilated; apex 3 times wider than the base; petiole almost smooth; condylus finely rimulose. Hind femora and tibiæ fuscescent at the apex, the latter also obsoletely annulated near the base. According to Wesmael the terebra is as long as the abdomen; but for this allowance must be made.

Described from four females, five males. Not very common. Found by Wesmael near Brussels; by Haliday on the banks of the Shannon; Capron has taken three females at Shiere, and it occurs occasionally at Nunton, Wilts. Bignell possessed five males, which he bred from *Tæniocampa stabilis*, View. Ratzeburg obtained it in July from *Phalera bucephala*, L., and *Gnophria quadra*, L.; the latter, he says, is sorely infested with this parasite. On emerging from the victim it spins a thread 2—3 inches long, from which it suspends itself head downwards and weaves its cocoon, which resembles that of *ictericus*.

32. *Meteorus luridus*, Ruthe.

Meteorus luridus, Ruthe, Berl. ent. Zeits., 1862, p. 57, ♂ ♀.

? Perilitus dilutus, Ratz., Ichn. d. Forst., i., 77 (imperfectly described).

Testaceous; face, mouth, cheeks, base of the antennæ beneath, prothorax, and legs paler; 1st abdominal segment, metathorax, head, mesothorax, and antennæ towards the apex, more or less infuscated; abdomen of the ♂ also usually darkened at the apex. Wings subfumato-hyaline; stigma and squamulæ yellow; recurrent nervure evected into the 2d cubital areolet, which is prolonged for its reception, or sometimes interstitial; 2d cubital areolet very slightly narrowed towards the radius. Tracheal grooves obsolete. Terebra hardly longer than ½ the abdomen. ♂ ♀. Length, 2½; wings, 5 lin.

Var. *a*. Entirely testaceous; metathorax and posterior abdominal segments inclining to rufous; antennæ fuscous at the tips, and all the articulations annulated with fuscous. ♂ ♀.

Var. β. Three fuscous patches on the lobes of the mesothorax; front, vertex in the middle, and occiput, black; metathorax and 1st abdominal segment more or less infuscated; antennæ fuscous, the base pale.

Var. γ. Meso- and metathorax black or infuscated on the disk; hind tibiæ sometimes ringed with fuscous before the base. ♀.

Var. δ. Head or mesothorax infuscated; scutellum rufescent; abdomen black, only the 2d segment anteriorly testaceous. ♂.

Very like *fragilis*, but somewhat stouter and larger; differing also in colour, in the habits of the larvæ, and in the structure of the cocoons. Out of twenty ♀ examples, says Ruthe, not one presented any black or fuscous shade on the abdomen behind the 2d segment. The 2d segment, however, is often of a paler yellow than those which follow. The striolæ on the condylus are finer and more numerous, often extending over a portion of the petiole. Wings larger and more obscure. Antennæ of the ♀ as long as the body, 30—33-jointed, in pale specimens testaceous almost to the apex, in darker specimens more or less fuscous, and paler beneath, the 2 basal joints always testaceous; those of the ♂ about half as long again as the body, 34-jointed. The varieties above mentioned are taken from Ruthe, as all the British examples that I have seen are pale.

Common near Berlin, according to Ruthe, from June to October. Only recently noticed in Britain; Capron has taken three females at Shiere. In Bridgman's collection is a ♀, bred Aug. 15th by W. J. Cross at Ely, out of *Eupithecia venosata*, F. Twenty-three specimens of both sexes were sent to Bignell by Mrs. Hutchinson, bred gregariously from a single larva of *Noctua brunnea*, F. Cocoons pale brown, irregularly heaped together, each covered with a thin web of filaments which hinders them from shining, not pensile. "The bunch of cocoons was found on the surface of the earth and moss in the cage, attached to one dead larva."

Explanation of Plate V.

Fig. 1. *Euphorus ornatus*, Marsh., ♀.
2. *Streblocera fulviceps*, Westw., ♀; 2 *a*, antenna ♂, after Westwood; 2 *b*, antenna of *Streblocera macroscapa*, Ruthe, ♀, after Reinhard.
3. Wing; and 3 *a*, antenna of *Eustalocerus clavicornis*, Wesm., from Van Vollenhoven's copy of Haliday's drawing.
4. *Wesmaëlia cremasta*, Marsh., ♀.
5. *Perilitus rutilus*, Nees, ♀.
6. *Meteorus deceptor*, Wesm., ♂.
7. *M. deceptor*, Wesm., ♀; 7 *a*, cocoon of *M. deceptor*.
8. Hind wing of *Meteorus albiditarsis*, Cur.
9. *Meteorus abdominator*, Nees, ♀.
10. *M. unicolor*, Wesm., ♀.

VIII. *Description of a new species of the lepidopterous genus* Carama, *together with a few notes on the genus.* By George T. Baker, F.E.S.

[Read March 2nd, 1887.]

Plate VI.

Carama Butleri, n. s. (Pl. VI., figs. 1, 2, & 3).

Alis anterioribus et posticis albis, thorace et capitis vertice cum anteriore parte pectoris et femoribus anticis nigricantibus.

Anterior and posterior wings white. In the male the costal border of the fore wings beneath is black, the vertex of head and collar white; front of pectus, palpi, and femora of anterior legs smoky black. In the female the black markings are replaced by a light tint of grey, and there is no trace beneath of the black costal margin. In one of my female specimens there is a dark mark on the costa just in front of the apex, but this does not appear in the others, neither is it visible in those in the Museum collection. The yellow bands on the upper surface of the abdomen are more marked in this species than in any other of the genus. Expanse, 38 mm.

All these specimens were sent me from Goya, Corrientes, South America, where it appears to be not uncommon.

Carama Butleri can be at once distinguished from any other of the genus by the vertex of the head and collar being white, whereas in all the rest either one or both are sulphur-yellow.

The whole of this group is a New World genus, all being found in South America. All are pure white, of a silky texture, the specific characters being mainly in the coloration of collar, head, pectus, and legs. The abdomen of the female is ringed above with yellow, but it is rarely much visible owing to the very long white hairs with which the body is clothed. Mr. Butler having monographed the genus (*vide* 'Cistula Entomologica,' vol. ii., pp. 203 and 204), it is unnecessary to give

detailed accounts of the species, though a few notes on each, with a short table of their points of difference, may not be without use, more especial reference being made to the plate ; and with this object I have carefully examined the specimens in the Museum, and, with Mr. Butler's permission, made free use of his monograph.

Carama Walkeri, Butl. (Pl. VI., fig. 11).

This is the largest species of the genus; the vertex of head is yellow, collar white; palpi, front of pectus, and inside of anterior legs smoky brown.

This was the species under which Walker included all, except *nivea*, of the then known species of the genus; it may, however, at once be distinguished from the others by its much larger size.

Carama virgo, Butl. (Pl. VI., fig. 10).

Vertex of head and collar sulphur-yellow ; palpi, front of pectus, and anterior legs blackish brown ; tarsi of other legs black.

This is easily recognised from *Walkeri* by its smaller size.

Carama ovina, Sepp. (Pl. VI., fig. 9).

Vertex of head and collar pale sulphur-yellow ; palpi, front of pectus, and inside of tibiæ of fore legs pale brown ; other legs all white.

Differs from *Walkeri* in its smaller size, and from *virgo* in the two pairs of posterior legs being all white.

Carama plumosa, Butl. (Pl. VI., figs. 4, 5, 6, & 7).

Collar only sulphur-yellow ; palpi, front of pectus, and fore legs smoky brown ; hind tarsi brownish ; rest of legs white.

Differs from *Walkeri* in its smaller size, and from *virgo* and *ovina* in that the vertex of the head is white and not yellow.

This species presents a very curious case of sexual aberrant neuration. On reference to the plate it will be seen that the male (having the normal neuration of the genus) emits all its branches in regular order, the fourth and fifth subcostal branches being emitted from a footstalk, whereas the female emits the third and fourth

branches from a footstalk, and the fifth from the inferior margin of the main vein, between the second and third branches, like unto a misplaced radial. This, though not overlooked by Mr. Butler, was not mentioned in his monograph; it cannot, however, be regarded as anything else than an aberration, the species in every other character being identical with the rest of the genus.

Carama pura, Butl. (Pl. VI., fig. 8).

Vertex of head and collar sulphur-yellow; face, palpi, front of pectus, and front of anterior legs smoky brown; rest of legs white.

Nearest allied to *orina*, but differs in that its face and front of anterior legs are smoky brown, which is not the case with that species.

Carama Butleri, n. s. (Pl. VI., figs. 1, 2, & 3).

♂. Vertex of head and collar white; palpi, front of pectus, and femora of anterior legs smoky black; costal margin beneath black.

♀. Similar to the male, but the black is replaced by a light shade of grey; and the costal margin beneath has no trace of black.

This may at once be separated from all its allied species by both the vertex of head and the collar being white.

Carama nivea, Cram.

There is no specimen of this in the Museum, but Cramer gives a description and a poor figure of it in his Pap. Exot., from which it appears very doubtful if it belongs to this genus. It is represented as larger than *Walkeri*, and has three reddish spots at the anal angle of the hind wing; these, however, may not improbably be stains, and is evidently a larger and altogether more robust insect.

The following table shortly sums up the main specific differences:—

- Palpi and front of pectus smoky-brown.
  - Vertex of head and collar white. — *C. Butleri.*
  - Vertex of head white; collar pale sulphur-yellow. — *C. plumosa.*
  - Vertex of head and collar pale sulphur-yellow.
    - Tarsi of four posterior legs black. — *C. virgo.*
    - Four posterior legs white.
      - Face and front of anterior legs smoky brown. — *C. pura.*
      - Inside of tibiæ in anterior legs pale brown. — *C. ovina.*
  - Vertex of head yellow; collar white. — *C. Walkeri.*

Explanation of Plate VI.

Fig. 1. Imago of *Carama Butleri.*
2. Front view of head, ♂, *C. Butleri.*
3. ,, ,, ,, ♀, ,,
4. ,, ,, ,, ♂, *C. plumosa.*
5. ,, ,, ,, ♀, ,,
6. Neuration, ♂, *C. plumosa* (typical).
7. ,, ♀, ,, (aberrant).
8. Front view of head, *C. pura.*
9. ,, ,, ,, *C. ovina.*
10. ,, ,, ,, *C. virgo.*
11. ,, ,, ,, *C. Walkeri.*

IX. *A revision of the genera* Acrolophus, *Poey, and* Anaphora, *Clem.* By The Right Honble. Lord Walsingham, M.A., F.L.S., F.Z.S., &c.

[Read April 6th, 1887.]

Plates VII. & VIII.

About a year ago I received from Mons. Emile Ragonot, President of the French Entomological Society, a box containing thirteen specimens which had the general appearance of the genus *Anaphora*, Clem. Perhaps, owing to their unlucky number, they had suffered woeful treatment on the journey. On carefully examining the remnants I found myself quite unable to recognise any named species, and at once determined to devote my first week of leisure to a study of the group to which they belonged. The literature of the subject is not voluminous. Taking the genera *Acrolophus* and *Anaphora** together, the number of species described amounts to fourteen only, some of which are already admitted to be synonymous. The peculiar form represented by these genera, having for its chief characteristic hirsute and greatly recurved or elevated palpi, appears to be confined to the two continents of America and to the West Indies, but extending to the Sandwich Islands, the Hawaiian genus *Stœberhinus*, Butl., obviously belonging to the same group. There are probably an infinite number of species scattered throughout the Nearctic and Neotropical Regions.

In general appearance these insects have a strong superficial resemblance to certain Asiatic forms chiefly included at present in the Indian genus *Alarona*, Wlk., but represented also in Africa. The different shape of

* I find on examination that the types of *Tirasia granulatella*, Walker, from Villa Nova, and *Eddara zylinella*, Walker, from Jamaica, are both females of some species of the *Anaphorinæ*, but it is not possible to adopt these generic names without knowing the structure of their respective males.

the palpi and of the anal appendages usually serves to separate them with precision, although their relationship is probably not remote. A discussion of the affinities of *Alavona* must be reserved for a separate paper. The genera now under revision may conveniently be placed in a subfamily of the *Tineidæ* under the name *Anaphorinæ*, but no arbitrary limitations can be placed upon this subfamily without a careful study of the structural characters of several presumably allied genera, such as *Tiquadra*, Walk., *Amydria*, Clem., *Setomorpha*, Z., &c.

The description of the larva of *Anaphora popeanella* ("*agrotipennella*"), contributed by Miss Murtfeldt to the 'Canadian Entomologist,' vol. viii., pp. 185-6, shows that the "thoracic legs" are "unusually long," that the "segmentation" is "strongly marked," and that the whole larva "tapers posteriorly from its greatest diameter at the head and first joint." The colour is described as "a dark purple-brown, the general surface dull, having the appearance of very fine stippling, but variegated with conspicuous, slightly elevated, polished spots, eight on each thoracic, and ten on each abdominal joint." "Head horizontal, broad and thick, of a highly polished black colour, the triangular face outlined by a fine line of brown." Its habits are decidedly peculiar, and remind one rather of a trap-door spider than a lepidopterous insect. It inhabited a tough silken gallery, "white and smooth inside," "which had an open entrance at the surface of the ground, from which its inmate emerged at night to feed" upon white clover. "The chrysalis was slender, elongate, the abdominal segments sharply edged but not serrated, and of a mahogany-brown colour. The palpal sheaths conspicuous, extending down on the ventral side as far as those of the antennæ." The chrysalis was ultimately found in the middle of the long subterranean silken gallery.

These larval habits, as well as the differently-formed sexual appendages and palpi seem to separate *Anaphora* and its allies from *Tiquadra*, Walk., which, under the name *Acareuta*, is described by Zeller (Horæ Soc. Ent. Ross, xiii., p. 201) as having a case-bearing larva.

No great difficulty is likely to arise in distinguishing all other known or rather described genera from those included in this paper; but intermediate forms may

probably be found. Some apology appears to be needed for the creation of an unwonted number of new generic names, but if the future study of the group is to be facilitated it is not well to ignore structural differences of palpi, antennæ, and neuration, such as are usually considered to possess generic value. The whole group has been very little studied, although largely represented on the other side of the Atlantic, and the time may probably come when some lover of the Micro-Lepidoptera, more fortunate or more industrious than myself, may be not ungrateful for this attempt at orderly subdivision, if it should enable him to distinguish and classify a much larger accumulation of specimens and species than I have ever had the pleasure to examine.

The generic characters have been taken chiefly from the form of the labial palpi and antennæ, and from the double or single apical vein of the fore wings. The sexual appendages on the ultimate segments of the bodies of the males have been found reliable in separating the species, although certainly not uniform throughout the genera. These appendages, both as to the form of the uncus,—sometimes single, sometimes double, sometimes arched, and sometimes angulated,—and as to the form of the lateral claspers presenting various modifications, seem to afford a not unnatural basis for specific distinction, inasmuch as they must more or less affect the process of mating and the transmission of hereditary peculiarities.

Full descriptions of these appendages are to be found in a paper by Dr. Buchanan White in the 'Annales de la Société Française' for 1878, p. 467, *et seq.*, entitled, "Observations sur l'armure génitale de plusieurs espèces françaises de Zygænidæ." In that paper the term "tegumen" is used to indicate the organ here referred to under the name "uncus"; whilst what I have called "lateral claspers" are entitled "harpagones." This terminology is discussed in a valuable paper in the 'Transactions' of the Linnean Society, 2nd ser., 1883, vol. ii., pt. 6, p. 270, by Mr. P. H. Gosse, who uses the terms "uncus" and "harpes," both of which I should perhaps have done better to have adopted.

Tabulation of Genera of Anaphorinæ.

A. Palpi erect or slightly recurved.
  a. Apical vein of fore wing forked.
    i. Palpi erect = Eulepiste, *Wlsm.*
    ii. Palpi appressed to the head = Neolophus, *Wlsm.*
  b. Apical vein of fore wing not forked.
    i. Antennæ bipectinate = Ankistrophorus, *Wlsm.*
    ii. Antennæ simple or serrated towards apex.
      1. Tarsal joints of hind legs strongly fringed above = Thysanoskelis, *Wlsm.*
      2. Tarsal joints of hind legs not strongly fringed above.
        aa. Palpi erect, with distinct separate tufts on each joint = Ortholophus, *Wlsm.*
        bb. Palpi slightly recurved, uniformly hirsute throughout = Pseudanaphora, *Wlsm.*

B. Palpi strongly recurved.
  a. Antennæ bipectinate = Felderia, *Wlsm.*
  b. Antennæ serrated throughout.
    i. Apical vein forked = Cænogenes, *Wlsm.*
    ii. Apical vein not forked = Anaphora, *Clem.*
  c. Antennæ simple, compressed, or slightly serrated at the ends.
    i. Apical vein forked.
      1. Head with erect crest = Urbara, *Wlk.*
      2. Head without erect crest = Hypoclopus, *Wlsm.*
    ii Apical vein not forked.
      1. Palpi roughly clothed throughout = Acrolophus, *Poey.*
      2. Palpi not roughly clothed throughout = Stœberhinus, *Butl.*

The following six species cannot at present be included in any tabular arrangement, so far as it may be dependent on the form of the uncus and lateral claspers :— *Acrolophus* (*Pinaris*) *hamiferellus*, Hb., *A. cervinus*, Wlsm., *A. vitellus*, Poey, *A. pallidus*, Möschl., *Anaphora leucodoeis*, *Z.*, *A. minima*, Wlsm. The genus *Pinaris* of Hübner, in which he places his Brazilian species *hamiferella*, included a number of European forms with short palpi; and Poey (Cent. Lep. I. Cuba) properly declines to recognise it as the type of that genus. We know nothing of its structure except that the palpi are long and recurved, and the antennæ apparently simple; expanse, 30 mm. Of *Acrolophus cervinus* I have not seen a male, but the form of the palpi in the female is precisely similar to those of the females of *Anaphora plumifrontella*. *Acrolophus vitellus*, Poey, having simple

antennæ, is taken as the type of that genus throughout this paper, but I have had no opportunity of examining the structure of its anal appendages. *Acrolophus pallidus*, Möschl., appears to be described from a single female from Parimaribo, the male not being known.

Anaphora leucodocis, Z., has the antennæ serrated, and may therefore safely be left in the genus in which it was placed by Zeller, as corresponding with *A. popeanella*, Clem. For the same reason *A. minima*, Wlsm., goes with it. The anal segments of my single specimen are somewhat injured; although much smaller it shows some affinities to *A. pusilla*.

Neolophus, n. g.

(Νεος = new, λοφος = a crest).

Type. *Neolophus furcatus*, Wlsm.

Labial palpi of male somewhat recurved, flattened against but not reaching beyond the crown of the head; of female shorter than in the male, not erect or recurved. *Maxillary palpi* small, depressed. *Antennæ* simple, but with lines of raised scales, giving an appearance of serration. *Fore wings* elongate, with the costa nearly straight, the apex slightly rounded, the apical margin oblique, scarcely convex; with 12 veins, 8 and 9 from a common stem. *Hind wings* as wide as the fore wings; with 8 veins, 6 and 7 parallel.

Neolophus furcatus, n. s. (Pl. VII., figs. 1, 1*a*, 1*b*).

Labial palpi, ♂, slightly recurved, reaching to the back of the head; the apical joint roughly clothed with appressed scales, not brush-like. *Antennæ* brownish ochreous, not serrated, although having that appearance at the tips, owing to the presence of raised scales. *Head, thorax, and palpi* dull greyish fuscous. *Fore wings* rather narrow, the costa almost straight, the apical margin oblique, scarcely convex; apical vein forked; greyish, sprinkled and striated around the margins with brownish fuscous; a broad irregular streak of brownish fuscous, from the base to the end of the cell, partly connected with two ill-defined spots of the same colour on the inner and outer thirds of the fold; fringes greyish fuscous. *Hind wings* pale greyish brown. *Abdomen* the same; lateral claspers narrow towards the base, rather triangular and upturned beyond it, obtusely rounded at the apex; uncus double,

nearly straight, scarcely at all bent over, its opposing branch below being of nearly equal length with itself. *Exp. al.* ♂, 19 mm.

Hab. A single male from Arizona, collected by Morrison.

Eulepiste, *Wlsm.*, Trans. Am. Ent. Soc., x., p. 169 (1882).

Type. *Eulepiste cressoni*, Wlsm.

"Head rough; maxillary palpi none,* tongue none, ocelli none. Labial palpi ascending, with the second joint roughly clothed with coarse scales, projecting beneath; terminal joint coarsely scaled, tapering to a blunt point; about equal in length to the second joint. Antennæ (with the basal joint thickened and coarsely scaled) slightly serrated and pilose beneath. Anal appendages of the male greatly developed; the side claspers elongate-ovate, projecting well beyond the triangular-pointed upper shield, which is clothed with long scales; the anal segment with short diverging bristles beneath. Fore wings: costa arched, apex rounded, apical margin oblique, slightly convex; dorsal margin nearly parallel with the costal, but slightly emarginate before the anal angle; apical vein forked. Hind wings ovate, rather wider than the fore wings, widest on the basal half, tapering outwards towards the rounded apex, and not emarginate below it. Veins of the fore wings twelve, not including the false vein after vein 1 on the dorsal margin; two of these from the same stem; cell closed. The vein running from the upper corner of the cell in the fore wings is forked, one branch ending on the costal margin and one in the apex."

Tabulation of Species of Eulepiste.

A. Lateral claspers narrow, with straight upper edge.. *cressoni*, Wlsm.
B. Lateral claspers wider, with arched or dilated upper edge .. .. *maculifer*, Wlsm.

Eulepiste cressoni, Wlsm.

Trans. Am. Ent. Soc., x., p. 169 (1882).

"Palpi brown, with ochreous scales intermixed, the apical joint with an indistinct pale ochreous band around its middle. Antennæ pale brown. Fore wings brown with scattered purplish fuscous and ochreous scales, the former collected in raised tufts, especially about the dorsal margin; the latter aggregated in the form of

* I find very short maxillary palpi in this genus and species, which were overlooked when the original description was made.

three or four square patches, one before and one beyond the middle of the dorsal margin, one about the middle of the costa, and one at or just before the apex. These in some specimens are so arranged as to form an indistinct chess-board pattern, the dark and pale squares being alternate on the costal and dorsal halves of the wing; in some specimens the median costal and the antemedian dorsal pale squares, which are always somewhat the more conspicuous, are joined in an angulated fascia. Abdomen with the hind wings and their cilia dull brown. The first two pairs of legs conspicuously spotted with brown and ochreous, the third pair ochreous on the tibiæ, spotted with brown on the tarsal joints. Expanse, 15 to 20 mm., the female being larger than the male. Texas."

To this I may add that the thorax is crested posteriorly, the uncus double with the points abruptly bent over, very closely approximate, and laterally compressed or flattened; the lateral claspers of approximately even width throughout, the ends rather square, but slightly oblique.

Eulepiste maculifer, n. s. (Pl. VII., figs. 1 *c*, 1 *d*).

Labial palpi, ♂, erect, the first joint thickly scaled beneath, the second and third joints without distinct tufts, brownish fuscous, paler on the inner sides and above. ♀ porrect, the first and second joints clothed with a coarse projecting tuft; the third joint only exposed, slender. *Antennæ* brownish, having a spotted appearance owing to thin lines of rather darker raised scales at the joints. *Head* brownish fuscous, tufted above the eyes. *Thorax and fore wings* brownish fuscous, the latter mottled with dark ferruginous and bearing a dingy white spot on the outer half of the fold and a more diffused and ill-defined patch of the same colour on the apical portion of the wing; there are some dull whitish markings in the cilia and before the anal angle; along the costa the brownish fuscous colouring is interrupted by paler and more greyish fuscous before and beyond the middle. *Hind wings* brownish. *Abdomen and hind legs* the same; tarsal joints spotted with fuscous; uncus slightly bent over, double, the points closely approximate; lateral claspers elongate, attenuated posteriorly, oblique at the ends, their upper extremity rather pointed. *Exp. al.* ♂, 20 mm; ♀, 20—24 mm.

Hab. Three males and two females from Arizona (*Morrison*).

Hypoclopus, n. g.

(ὑπόκλοπος = hidden or furtive).

Type. *Hypoclopus griseus*, Wlsm.

Labial palpi, ♂, overarching the thorax; all the joints roughly clothed; ♀ short, porrected. *Antennæ* pilose, slightly serrated towards the apex. *Fore wings* with the costa rather straight, the apical margin oblique, somewhat attenuated towards the base; apical vein forked. *Hind wings* slightly wider than the fore wings; uncus single.

The necessity for establishing this genus rests upon the wide difference in the structure of the palpi from those of *Neolophus*, with which in all other respects it perfectly agrees. It differs from *Cænogenes* in its antennæ, and from *Urbara*, Walk., in the absence of an erect crest at the top of the head, as well as in the form of the wings.

Hypoclopus griseus, n. s. (Pl. VII., figs. 2, 2*a*, 2*b*).

Palpi, ♂, overarching the thorax and reaching to its posterior margin; ♀ short, standing straight forward from the head about 1 mm. *Antennæ* dull greyish ochreous; ♂ compressed, ovate, pilose, having a serrate appearance owing to lines of partially raised scales on their anterior sides; ♀ simple. *Head, thorax, and palpi* with an equal admixture of hoary and greyish fuscous scales. *Fore wings* greyish fuscous, profusely sprinkled with hoary scales, which predominate in a patch below the middle of the fold; a sprinkling of dark fuscous scales is also noticeable, especially along the costa, where they form a series of small dots, and at the outer end of the cell, where they are concentrated into an ill-defined dark fuscous patch; a smaller dark fuscous patch occurring beyond the middle of the fold. In the fringes patches of hoary and greyish fuscous scales alternate with each other. The apical vein is forked. *Hind wings* reddish brown; fringes cinereous. *Abdomen* cinereous; lateral claspers attenuated in the middle and widened posteriorly, their ends rounded above, obtusely angulated below. The uncus is bent over and is single, but a supplementary point with a double stem in the form of the lower mandible of a bird, coming from below it, reaches nearly as far as the uncus itself. *Exp. al.* 26 mm.

Three males and one female received from Morrison, collected in Arizona. This species may be distinguished by its almost square-ended lateral claspers, and by the length of the opposite branch of the uncus, which,

although it occurs in other species, does not appear to attain the same proportions; the forking of the apical vein and the single uncus separate it from other species having much the same general appearance.

URBARA, *Wlk.*, Cat. Lep. Het. B. M., xxix., 835 (1864).

Type. *Urbara galeata*, Wlk.

"♂. Body rather stout. Head above with a thick erect tuft of hairs. Eyes large, prominent. Proboscis distinct. Palpi thick, erect, thickly clothed with long erect hairs, nearly twice longer than the breadth of the head; first joint long, but much shorter than the second; third about half the length of the second. Antennæ slender, minutely setulose, much shorter than the fore wings. Legs stout, squamous; spurs long. Wings rather narrow, rounded at the tips; exterior border very oblique hindward."

To this may be added that the apical vein is forked.

Urbara galeata, Wlk.

Wlk., Cat. Lep. Het. B. M., xxix., 835 (1864).

"♂. Brown. Head above and palpi blackish brown. Legs cinereous. Fore wings with four black points in the disk; two of these in a direct line between the other two and the interior border; a row of black points along the exterior border. Length of the body, 4 lines; of the wings, 12 lines.

"*a*. Ega. From Mr. Bates's collection."

The apical joints of the palpi are broken off, but have evidently been long and recurved, as in *Anaphora* and *Acrolophus*.

THYSANOSCELIS, n. g.

(θύσανος = a fringe, σκέλος = a leg).

Type. *Thysanoscelis hirsutus*, Wlsm.

Labial palpi recurved, closely appressed to the head, but not reaching above the crown; second joint thickly clothed with a stout, close brush of scales; apical joint short, also concealed in rough scales. *Maxillary palpi* depressed. *Antennæ* with the basal joint tufted or bearing a close brush of scales, simple. *Tongue* very short. *Thorax* tufted. *Fore wings* elongate, rounded at the apex, with the costa slightly arched near the base, the costal and dorsal margins beyond parallel; bearing patches of raised scales; all the veins separate, 8 and 9 from the same point. *Hind wings* slightly wider than the fore wings, ovate. *Posterior legs* with the inner spurs much longer than the outer, with strong erect brushes

of scales above to the penultimate tarsal joint. *Abdomen*, lateral claspers wide at the base, slender and straight beyond; the uncus double, points closely approximate. The form of the uncus and lateral claspers should probably be regarded as having rather a specific than a generic value.

Thysanoscelis hirsutus, n. s. (Pl. VII., figs. 3, 3*a*, 3*b*, 3*c*).

Head and palpi whitish fawn, inclining to ochreous above; the palpi with a few brown scales at the sides. *Thorax* whitish fawn, speckled and mottled with brownish ochreous, sparsely irrorated with dark brown scales, some beneath the costa, some on the disc and beyond it, others on the fold; the extreme base of the costal margin is umber-brown; three patches of raised scales are especially noticeable, one above, the other below the middle of the fold, the third on the fold and near its outer end. *Hind wings* greyish brown; fringes cinereous. *Abdomen* greyish brown; anal tuft cinereous; lateral claspers slender, rounded at the apex; uncus double, bent over, not angulated. *Exp. al.* 17½—20 mm.

Espirito Santo, Brazil. I have two males of this curious species, purchased of Deyrolle in Paris many years ago. They obviously belong to the same group as *Acrolophus*, *Anaphora*, &c., but cannot, so far as I can determine, be rightly included in any hitherto described genus.

Ankistrophorus, n. g.

(Ἄγκιστρον = a hook, φορεῖν = to carry).

Type. *Ankistrophorus corrientis*, Wlsm.

Labial palpi erect, thickly clothed; apical joint short, not brush-like, not reaching the thorax. *Maxillary palpi* 3-jointed, slender, not folded. *Ocelli* wanting. *Antennæ* bipectinate, the pectinations short, fringed with delicate hairs. *Fore wings*, costa straight, apical margin oblique, scarcely convex; neuration as in *Anaphora*; apical vein not forked. *Abdomen*, lateral claspers more or less spoon-shaped, inverted; uncus double, with small supplementary lateral processes.

Ankistrophorus corrientis, n. s. (Pl. VII., figs. 4, 4*a*, 4*b*).

Labial palpi cinereous, somewhat darkened above at the base. *Antennæ* cinereous. *Head and thorax* cinereous, the latter strongly tufted posteriorly. *Fore wings* cinereous, much clouded and speckled with dark greyish fuscous, of which the more conspicuous patches are at the base and end of the cell, and above the

outer third of the fold. The wings vary considerably in colour in different specimens, the dark shading being much reduced in some and increased in others. *Hind wings* fuscous, with a decided purple tinge in good specimens; the fringes cinereous. *Abdomen* greyish fuscous; the lateral claspers somewhat spoon-shaped and inverted, but of approximately even width throughout, except at the extreme base; the uncus is double, the points slightly diverging and wide apart; in three out of four males under observation these points are completely bent under from the base, reaching nearly to the narrow stem of the lateral claspers; two small supplementary processes reach to the base of the uncal points; the opposing point beneath the uncus is short and double. *Exp. al.* 27 mm.

Five males collected at Goya, Corrientes, Argentine Republic, by Mr. L. K. Perrens.

Acrolophus, *Poey*, Cent. Lep. Cuba (1832).

Type. *Acrolophus vitellus*, Poey.

Poey thus describes this genus:—

"Lingua nulla, antennæ simplices; palpi longissimi, recurvi, post tergum rejecti; articuli omnes usque ad apicem barbati; fimbria anali longa.

Genre *Acrolophe*, Poey.

"Point de langue distincte, antennes simples, palpes très longs, couchés sur le dos, avec tous les articles barbus jusqu'a' l'extrémité; frange longue vers l'angle de l'anus."

Tabulation of Species of Acrolophus, *Poey*.

A. Uncus single = *simulatus*, Wlsm.

B. Uncus double.

a. With supplementary lateral processes = *plumifrontellus*, Clem.

b. Without supplementary lateral processes.

i. Points of the uncus laterally compressed = *argentinus*, Wlsm.

ii. Points of the uncus not laterally compressed.

1. Lateral claspers spoon-shaped, widened in the middle = *arizonellus*, Wlsm.

2. Lateral claspers slender, scarcely dilated.

aa. The points of the uncus acute *texanellus*, Cham.

bb. The points of the uncus obtuse = *mortipennella ?*, Grote.

Not included in the above tabulation (see p. 140):— *hamiferellus*, Hüb.; *cervinus*, Wlsm.; *vitellus*, Poey; *pallidus*, Moschl.

Acrolophus vitellus, Poey.

Poey, Cent. Lep. Cuba (1832).

"Alis luteo-fuscis, atomis anticarum nigris, costa nigra punctata."

Acrolophe vitellus.— Ailes d'un jaune brun ; les supérieures couvertes d'atomes noirs, plus distincts sur la côte.

After this short description Poey refers to the figure, which shows the expanse of the wings to be about 20 mm. The neuration of the fore wings, which is also figured, proves that the apical vein is not forked. One specimen, Cuba.

Acrolophus simulatus, Wlsm. (Pl. VII., fig. 7).

Acrolophus? simulatus, Wlsm., Trans. Am. Ent. Soc., x., 168—9 (1882).

"Head rough ; maxillary palpi none ; tongue none ; ocelli none. Labial palpi recurved over the head and part of the thorax ; the second joint very long, roughly clothed with projecting scales beneath ; third joint about half as long as the second, brush-like, with very long diverging scales on the under side. Antennæ strong, slightly pubescent, somewhat serrated on both sides, especially towards the apex. The anal appendages in the male much developed, the elongate ovate side claspers not reaching beyond the upper shield, which is triangular and pointed.* Fore wings with the costal margin arched, apex rounded, apical margin oblique, slightly convex, the dorsal margin somewhat convex, not emarginate before the rounded anal angle. Hind wings ovate, wider than the fore wings. Fore wings with twelve separate veins. The vein from the upper corner of the discal cell in the fore wings ends on the costal margin, and is not forked ; cell of hind wings not closed. Alternate brown and whitish ochreous patches along the costal and dorsal halves of the fore wings, the paler portions apparently predominating rather more than in *Eulepiste cressoni*, the darker portions assuming the form of two angulated fasciæ ; there are numerous raised bluish fuscous scales scattered especially about the darker patches. Hind wings and cilia dull brown. Expanse, 15 mm. Texas."

To the description of this species I should wish to add that the antennæ are not strictly serrated in struc-

* As seen from above.

ture, but have a serrated appearance caused by rings of slightly elevated scales. The lateral claspers slender, attenuated near the base, dilated downwards beyond; their upper edge being nearly straight, the tapering ends evenly rounded and slightly bent inwards. The uncus is single, with the point short and very little bent over. On re-examination of the cell of the hind wings I find a slender nervure closing it at the end.

Acrolophus plumifrontellus, Clem. (Pl. VII., figs. 5—5*c*).

Anaphora plumifrontella, Clem., Proc. Acad. Nat. Sci. Phil., 1859, 261; Tin. Nor. Amer., 39, 57, 59, 60; Z., Bei. z. Kennt., xxiii., 217 (1873).

A. bombycina, Z., Bei. z. Kennt., xxiii., 216—7 (1873).

"Labial palpi reddish brown. Thorax dull brown, tinged with reddish. Fore wings rubescent and maroon-brown intermixed, the former hue prevailing along the fold, at the base along costa and disc, dusted with dark brown: with a dusky or dark brownish spot on the end of the disc, one about the middle of the fold and another near the base. In some specimens these spots are quite indistinct. Hind wings dusky brown. Exp. al. 17 lines (= 36 mm.) Females not known."

To this description we may add that the antennæ are compressed, not strictly serrated throughout, but only slightly so towards the tip; lateral claspers spoon-shaped, rather abruptly dilated and bent, with a pair of supplementary claspers above them, nearly as long as themselves; uncus double, the points parallel and divided.

I have four females from North Carolina, of which the following is a description:—

Labial palpi extended straight out beyond the head, roughly clothed but tapering to a point, 5 mm. long.

Fore wings full 6 mm. wide, with the costa slightly rounded; the apical margin also convex. *Exp. al.* 35 mm.

I have a considerable number of males from North Carolina which agree with a specimen compared with the type at Philadelphia in 1871. In Zeller's series are four specimens; two from Massachusetts, sent by Mr. Packard and labelled "*bombycina*, Z."; a third from New York, with a label in Mr. Grote's handwriting, "*plumifrontella*, Clem."; the fourth is labelled "*bombycina*" in Zeller's writing, and is a female, evidently of a different species, from Buenos Ayres, received from

Lederer.* We may thus safely conclude that *bombycina* and *plumifrontella* are one and the same species.

Although *plumifrontella*, being the first species described by Clemens under his genus *Anaphora*, has been regarded as his type, it does not so well agree with his generic description in the matter of serrate antennæ as *popeanella*, a fact which he emphasises by putting a heading in italics above the description of the latter species, "*Antennæ of ♂ distinctly serrated beneath.*" It will therefore be convenient to regard *popeanella* as the type of the genus *Anaphora*, and to place *plumifrontella* in *Acrolophus* under the distinguishing character of "Antennæ simple, compressed, or slightly serrated at the ends."† *Arcanella* falling into *Orthologhus* on account of its erect palpi.

Acrolophus mortipennellus, Gr.

Anaphora mortipennella, Gr., Can. Ent., iv., 137 (1872), Can. Ent., xviii., 199; Wlsm., Trans. Am. Ent. Soc., x., 167.

"♂. Labial palpi reflexed, thrown back over and as long as the dorsum of thorax, but not closely applied, thickly scaled, but less so than in allied species, fuscous outwardly along the sides, dead whitish on the inside. Head and thorax above dead or dirty whitish. Primaries pale, dirty whitish, with heavily sprinkled black scales on costal region at base, fading outwardly. A black scale patch at extremity of discal cell, and a larger one on submedian fold, below median vein, at about the middle of the wing; parallel with this at base a few black scales. There is a faint sprinkling of black scales over the median nervules, and about internal angle are two or three better marked black points on the margin. Four costal black marks before the apex, the first of these above discal spot; other costal marks towards the base of the wing. Fringes fuscous, faintly lined. Secondaries fuscous, much darker than, and strangely contrasting with, the pallid primaries. Beneath both wings fuscous with ochrey stains. The basal joint of labial palpi is prominently dark fuscous or blackish outwardly. Expanse, 25 mm. Central Alabama. June."

* Professor Zeller (Verh. z.-b. Ges. Wien, 1873) mentions his doubts about this South American female, but remarks that his scruples were removed by the fact that "the wing-veins correspond exactly" with those of the male from Massachusetts.

† See foot-note to p. 155.

"Smaller than *A. plumifrontella*, and easily recognised by its pallid discolorous fore wings, which are also a little more determinate at apices and internal angle than usual."

I am not absolutely certain about the identity of this species; the only specimen I have seen with that name attached was in a box sent to me for examination by Prof. Fernald. I understood it had been obtained from Miss Murtfeldt, but was very doubtful at the time whether it was truly Grote's *mortipennellus*. The memorandum I have about it shows that the apical vein was forked, which would probably throw it into the genus *Neolophus*, but its colouring differed considerably from the two species of that genus now described. In Mr. Grote's collection in the British Museum are several specimens with antennæ simple and apical vein not forked, which agree with the description, but are not labelled. These have the uncus double, not sharpened at the points, which slightly diverge; the lateral claspers long and slender, of almost even width beyond their narrow stem, and evenly rounded at the ends. I have little doubt that they represent the true *A. mortipennellus*, Grote.

Acrolophus cervinus, n. s. (Pl. VII., fig. 6).

Palpi, ♀, porrect, about 5 mm. long; whitish fawn-colour. *Head and thorax* the same. *Antennæ*, ♀, simple. *Fore wings* pale fawn-colour, the apex obtuse, apical margin oblique, costal margin straight and nearly parallel with the dorsal margin throughout; a few dark fuscous scales are sparsely sprinkled about the apical margin of the fore wings. *Abdomen and legs* of same colour as hind wings. *Exp. al.* 34 mm.

Two females collected by Belfrage in Texas on the 16th and 18th May (about 1868) respectively. I have not seen the male of this species, but, although probably closely allied to *plumifrontellus*, the narrow fore wings with straight costa and almost straight oblique apical margin show it to be distinct from that species.

Acrolophus argentinus, n. s. (Pl. VII., fig. 8).

Palpi, ♂, recurved and reaching beyond the middle of the thorax. *Antennæ* greyish ochreous, serrated. *Head, thorax, and palpi* dull greyish fuscous. *Fore wings* greyish fuscous, slightly mottled

with dark fuscous along the extreme costal margin, with a conspicuous dark brownish fuscous blotch on the middle of the fold, dilated upwards and blending with the ground colour of the wing its lower edge overlapping the fold, somewhat angulated and more clearly defined; beyond it is a less conspicuous small patch of the same colour at the end of the cell, followed by a few brownish ochreous scales; apical vein not forked. *Hind wings* pale brownish fuscous. *Abdomen* greyish fuscous; the anal appendages are of an ordinary form, the lateral claspers being somewhat narrowed towards the base, of even width beyond, the ends rounded; the uncus is double, evenly curved, somewhat laterally compressed, the points closely approximate and converging. *Exp. al.* 27 mm.

Hab. Two males sent by Mons. Ragonot labelled "Buenos Ayres."

Acrolophus texanellus, Chamb. (Pl. VII., fig. 9).

Chamb., Bull. U. S. Geol. and Geog. Survey, iv. (1), p. 79 (1878).

Chambers describes this species as follows: –

"Very distinct from *plumifrontella*, *popeanella*, and *arcanella*, Clem., and from *agrotipennella* and *mortipennella*, Grote; nor can I recognise it at all in *Scardina* or *Bombycina*, as described by Zeller. Palpi overarching the thorax, dark brown on the outward, luteous-brown on the inner surfaces. Antennæ compressed, straw-yellow; thorax dark grey-brown; fore wings brown, tinged with greyish yellow; the usual spot at the end of the disk indistinct; the other spots common to the wings of the other species I cannot find in this. One of them may be represented by an indistinct blackish line beneath the middle of the fold. Hind wings and abdomen fuscous-grey, like the thorax, and a little darker or rather less yellowish than the fore wings. Under surface of both wings greyish fuscous. Smaller than any specimens that I have seen of the other species, having an *alar expansion* of only nine lines. Bosque County, Texas."

To this I may add that the antennæ are compressed, flattened, having a roughened or serrated appearance caused by lines of slightly raised scales around each joint. The apical vein of the fore wing is not forked. The lateral claspers are narrow, elongate, slightly upturned from near the base, but straightened beyond, not spoon-shaped, but evenly rounded and slightly inverted at the apex. The uncus is double, straight, the points scarcely at all bent over, very short, not closely approximate, slightly diverging.

Acrolophus arizonellus, n. s. (Pl. VII., fig. 10).

Palpi, ♂, recurved, reaching beyond the middle of the thorax; ♀ short, slightly upturned, but scarcely reaching more than the length of the head beyond it. *Antennæ* subochreous, rather flattened, simple, having a very slight notched appearance owing to the scales on the upper side being a little raised at the joints. *Head, thorax, and palpi* pale brownish, with a slightly hoary appearance from an admixture of grey hairs. *Fore wings* greyish brown, sprinkled with dark brown scales; the costal margin very narrowly subochreous, with about six pairs of ill-defined dark brown dots along it; a conspicuous dark brown spot at the end of the cell and another on the fold at one-third from the base; below this in one specimen is a pale patch; the fringes slightly paler than the wing, but mottled with brown; under side pale brownish, the margins narrowly greyish ochreous. *Hind wings* brown, with pale tips to the fringes; under side pale brownish. *Abdomen*: the long hairy clothing of the base of the abdomen above is pale greyish ochreous, the abdomen itself inclining to brown; lateral claspers elongate, spoon-shaped, curved inwards, tending to form a slight angle at their upper and outward extremity; the uncus double, with the two points very slightly diverging and not widely separated. *Exp. al.* ♂, 25 mm.; ♀, 36 mm.

I have a male and two females from Arizona, collected by the late Mr. Morrison.

Acrolophus pallidus, Möschl.

Möschler, Verh. zool.-bot. Ges, in Wien, xxxi., p. 438, n. 138, t. 18, f. 46 (1881).

I am indebted to Mr. Kirby for the following translation of the original description, which I have not seen:—

"Intermediate in size between *P. hamiferella*, Hübn., Zutr., 441, and *scardina*, Zell., but may be at once distinguished from both by the ground colour of the wings. Antennæ ochreous (lehmgelb), palpi ochreous, the basal and middle joints dark brown at the sides. Head and thorax reddish ochreous, upper side of the abdomen dark umber-brown, under surface and pectus light ochreous; front legs dark brown on the outside and pale yellow on the inside; middle legs pale yellow, the tarsi dark brown on the outside; hind legs pale yellow, the tibiæ dark brown on the outside, and the tarsi spotted with brown on the outside. Fore wings reddish ochreous, the inner margin suffused with brownish towards

the anal angle, the costa marked with black dots, and the rest of the wing sparingly sprinkled with less distinct ones. Fringes of the colour of the wings, and brownish at the tips. Hind wings dark umber-brown, costa pale yellow, fringes greyish brown, divided by a greyish yellow line. Under side umber-brown. Fore wings dirty ochreous, in the marginal area, dusted with brown. Hind wings with the costa narrowly ochreous, and the hind margin still more narrowly edged with ochreous, and ochreous-yellow scaling is visible over the whole surface of the wings; marginal line finely brown. Fringes of the fore wings yellowish at the base and greyish yellow at the tip, the hind wings greyish yellow, with a more brownish line of separation. 33.6 mm.

"One female from Paramaribo."

Acrolophus hamiferellus, Hb.

Pinaris hamiferella, Hb., Zutrage, figs. 441, 442; Poey, Cent. Lep. I. Cub.

Hübner's description is short and somewhat vague: it may be rendered as follows:— "This remarkable species, whose palpi curve back over the head to the base of the abdomen, can at most be compared with *heracliella*, with which it has some resemblance in general habit, but scarcely any at all in the shape of the wings." The locality given is Rio Janeiro, and, if the figure is correct, the apical vein is not forked, the antennæ are simple, and the expanse of the fore wings is 30 mm.

Cænogenes, n. g.

(καινός = new, γένος = race).

Type. *Cænogenes perrensella*, Wlsm.

Labial palpi, ♂, recurved, overarching the thorax; ♀ short, porrected. *Antennæ* serrated throughout on both sides and pilose. *Fore wings* with the costa slightly arched, apical margin oblique; the apical vein forked. *Hind wings* scarcely wider than the fore wings; uncus single.

This genus belongs to the section of the subfamily *Anaphorinæ*, which is distinguished by strongly recurved palpi. The structure of the antennæ at once separates it from the other genera in this section, which resemble it in having the apical vein of the fore wings forked. I believe it will be found to be represented in North

America. A specimen sent to me for examination some years ago by Prof. Fernald under the name *Anaphora mortipennella*, Grote, greatly resembled it in structure; the apical vein was forked, which is not the case with specimens in Grote's collection at the British Museum; these I think may be more correctly regarded as the types of that species.

Cænogenes perrensella, Wlsm. (Pl. VII., figs. X, X *a*).

Labial palpi dull whitish, recurved over the thorax, touched with fuscous on the outer sides at the extreme base. *Antennæ* luteous, serrated on both sides and pilose. *Head, thorax, and fore wings* dull whitish, the latter smeared with dark fuscous at the base of the costal margin with two patches of fuscous scales, the one at the commencement of the outer third of the fold, the other less conspicuous on the outer end of the cell; the surface of the fore wings is more or less sprinkled with short lines of fuscous scales, especially along their costal and apical portions. *Hind wings* very pale brownish fuscous. *Abdomen* the same; the lateral claspers are slender, slightly dilated posteriorly, obliquely terminated, the uncus single, bent over, not angulated. *Exp. al.* ♂, 15 mm.; ♀, 17 mm.

A pair received from Mr. L. K. Perrens, collected at Goya, Corrientes, Argentine Republic.

Anaphora, *Clem.*, Proc. Acad. Nat. Sci. Phil., 1859, pp. 260—1; Tin. Nor. Am., pp. 56—7.

Type. *Anaphora popeanella*, Clem.

Dr. Clemens thus described the genus *Anaphora*:—

"Head hairy, concealed by the labial palpi in the ♂, free in the ♀. Ocelli none. Eyes small. Antennæ but little longer than the thorax, *serrated beneath, with the ends of the articles finely ciliated.* Maxillary palpi moderately long, scaly, and three-jointed in both ♂ and ♀. Labial palpi in the ♂* greatly developed, ascending and thrown back on the dorsum of the thorax, which they equal in length; the first article scaly, arctate and equal, to the superior margin of the eyes, and the two succeeding ones equal and furnished with abundant spreading hairs; in the ♀ short, not ascending above the eyes, articles nearly equal, the first and

* Mr. Stainton's note in his edition of Clemens' papers is as follows:—"This is printed ♀ in the original, but Dr. Clemens has marked in pencil that it should be ♂."—H. T. S.

second hairy beneath, the third rather smooth and porrected. *Tongue wanting.* Wings exceeding the tip of the abdomen; the *anterior* with costa nearly straight, hind margin obliquely convex, inner margin nearly straight, but slightly emarginate above the interior angle; the *posterior* ovate, and both with rather short cilia."

The types of this genus, according to Clemens, are *popeanella*, *plumifrontella*, and *arcanella*; but of the latter he writes, "*Labial palpi shorter in ♂ than in the preceding; ascending, but not recurved.*" This description conflicts with his statement that in this genus the labial palpi equal the thorax in length, and if we take it that it is an essential character of the genus that they should do so, *arcanella* should properly be eliminated, but its exclusion renders a new generic description necessary. Taking the shorter palpi as the main character of the new genus, I have proposed to separate it under the name *Pseudanaphora*. The antennæ of *plumifrontella* are certainly not serrated in the strict sense of the word;* those of *popeanella* are distinctly serrated. *Popeanella* therefore is the species which most precisely agrees with the characters of the genus *Anaphora*, and may conveniently be taken as the type; while *plumifrontella* may more properly be relegated to the older genus *Acrolophus*. One correction should certainly be made in Clemens' tabulation of genera, "*Antennæ serrated beneath in both ♂ and ♀ Anaphora.*" The females of all the species appear to have simple antennæ. I can certainly answer for those of *popeanella* and *plumifrontella*.

Tabulation of Species of Anaphora, *Clem.*

A. Uncus abruptly angulated.

a. Lateral claspers with a notch at the ends = *bogotensis*, Wlsm.

b. Lateral claspers without a notch at the ends.

I. Lateral claspers toothed on the under side = *ferruginea*, Wlsm.

II. Lateral claspers not toothed on the under side.

1. Points of the uncus distinctly separate = *popeanella*, Clem.

2. Points of the uncus closely approximate = *morrisoni*, Wlsm.

* See p. 148. Prof. Zeller (Verh. z.-b. Ges. Wien., 1873) draws attention to this difference, and points out that whereas in one species the serrations are long and separate, in the other they are yet distinguishable under a miscroscope, but are shorter, broader, truncated at the end, and so closely pressed together that they are only divided from each other when the antennæ are bent backwards.

B. Uncus curved over.

a. With supplementary processes on each side of the uncus.

I. These long and conspicuous = *ornata*, Wlsm.

II. Short and inconspicuous = *tenuis*, Wlsm.

b. Without supplementary processes on each side of the uncus.

I. Uncus long and slender, with lateral excrescences at its middle = *uncigera*, Wlsm.

II. Uncus without lateral excrescences at its middle.

1. Lateral claspers evenly rounded at the ends = *propinqua*, Wlsm.

2. Lateral claspers terminated obliquely.

AA. Points of the uncus closely approximate = *pusillus*, Wlsm.

BB. Points of the uncus distinctly separete = *macrogaster*, Wlsm.

Not included in the above tabulation (see p. 140):—*minima*, Wlsm.; *leucodosis*, Zell.

Anaphora morrisoni, n. s. (Pl. VIII., fig. 12).

Palpi recurved, reaching to the posterior margin of the thorax, purplish fuscous. *Antennæ* cinereous, stout, serrated, the ends of the articles being fringed with delicate hairs. *Head and thorax* greyish fuscous. *Fore wings* purplish fuscous, without conspicuous markings, the usual discal and apical spots being indicated by dark fuscous scales; apical vein not forked. *Hind wings* greyish fuscous-cinereous. *Abdomen* purplish fuscous; lateral claspers approximately of equal width throughout, evenly rounded at the ends; the uncus double, abruptly angulated above and bent straight down, with a small protruding knob at the angle; the points very closely approximate. *Exp. al.* 18 mm.

Florida (*Morrison*); two males.

Anaphora propinqua, n. s.

Palpi recurved, reaching to the posterior margin of the thorax, purplish fuscous. *Antennæ* cinereous, stout, serrated, the ends of the articles being fringed with delicate hairs. *Head, thorax, and fore wings* purplish fuscous, the latter without conspicuous markings, the usual discal and apical spots being indicated by dark fuscous scales; no ferruginous shade on fold or disc; a few irregularly distributed white scales, single or in groups of two to four, are noticeable on the outer portion of the wing and on the end of the fold; these appear to be loosely attached and very fugitive; apical vein not forked. *Hind wings* greyish fuscous-cinereous. *Abdomen* purplish fuscous; the lateral claspers of much the same form as in *morrisoni*. The uncus is double, arched over, not angulated, and

with the points closely approximate; differing very decidedly in form from that of *morrisoni*, from which species the whole insect is otherwise scarcely distinguishable. *Exp. al.* 18 mm.

Florida (*Morrison*); two males.

Anaphora pusilla, Z. (Pl. VIII., fig. 13).

Zell., Hor. Soc. Ent. Ross., xiii., 196–7 (1877).

"Parva; antennis ♂ arcte serratis, palpis præter basim teretibus, apice barbato; alis aut latis, rotundatis, brunnescentibus, macula venæ transversæ una, duabus plicæ margineque postico nigro-fuscis. ♂."

The following is a translation of Zeller's description:—

"The smallest species known to me; with broad wings, and very similar in colour and pattern to my *A. scardina*; but it differs from all others in the naked palpi, only furnished with a tuft of hair-like scales at the end.*

"Smaller than *Depressaria applana*. Body brown. Palpi recurved to the end of the roughly-scaled thorax, cylindrical, clothed with short thickly appressed scales, very pale brownish, the basal joint thickened by longer raised scales, and for the most part dark brown; the terminal joint ends in a compressed brown brush of scales. Antennæ very pale brown, compressed, the under surface very closely serrated, pubescent. Abdomen brownish grey. Legs pale brownish grey, front femora and tibiæ brownish, the middle tibiæ only of this colour outwardly. Fore wings 3¾ lines long,† broad, rather widened behind, with a well-marked tip, and gradually rounded hind margin, pale greyish brown, palest on the inner marginal half; the hinder three-quarters of the costa is marked with obsolete dark dots. The markings consist of three

* To this character, somewhat prominently mentioned by Zeller, I am not disposed to attach any great importance. In a series of *A. popeanella* I find the palpi in many different positions, and greatly varying in the degree to which they are denuded. Some have precisely the appearance of Zeller's type of *A. pusilla*, and I cannot but regard the absence of long scales on the first and second joints of the palpi in that species as the result of denudation. These remarks do not apply to the genus *Stœberhinus*, Butler (Ann. Mag. Nat. Hist., 1882, p. 402), founded on a somewhat similar peculiarity. The palpi of the type of *Stœberhinus*, although probably not quite in a natural position when erect, are quite natural in having their stem smoothly scaled, the apical joint only brush-like.

† The type-specimen measures 15½ mm.

blotches formed of coarse dark brown scales, one in the fold at one-third, a larger streak before the transverse nervure, which is larger than the first. The hind margin of its fringes are pretty thickly sprinkled with dark brown scales, except at the tip and anal angle. Hind wings rounded at the tips, greyish brown, paler than the fore wings. The terminal half of the hind marginal fringes, and the whole of the inner marginal fringes, light grey. The whole under side coloured like the hind wings above. One male taken at the lamp at Barranquilla, 31st December, by Baron von Nolcken."

To this I may add that the apical vein is not forked; the lateral claspers are dilated downwards below the middle, thence tapering upwards to an obtusely rounded point; the uncus is double, bent over the points, touching each other.

Anaphora minima, n. s.

Palpi overarching the thorax, reaching to its posterior margin. *Antennæ* greyish ochreous, strongly serrated and fringed with fine hairs. *Head, thorax, and palpi* greyish ochreous; the palpi dark fuscous beneath at the base. *Fore wings* greyish ochreous, reticulated with dark fuscous; a spot of ferruginous-brown scales at the end of the cell. *Hind wings and fringes* cinereous. *Abdomen* cinereous. The anal appendages in this specimen are too much injured to admit of description, but in other respects the specimen is extremely perfect. *Exp. al.* 13 mm.

Hab. I am indebted to Mr. J. H. Leech for a single male from Ceara, Brazil, collected in August, 1884. It is allied to *pusilla*, but differs not only in its markings, but in its narrower fore wings and smaller size: its palpi are amply clothed throughout.

Anaphora leucodocis.

Zell., Hor. Ent. Ross., xiii., p. 197—8, no. 2 (1877).

Parva, antennis setaceis, palpis ultra thoracem reflexis, valde pilosis; alis aut acuminatis, grisco-lutescentibus, stria ex basi in apicem perducta alba, antice nigro-marginata. ♂.

Translation of original description (*Mr. Kirby*):—

"This species, which stands next to *A. pusilla* in size, is distinguished from all others by the sharply-pointed fore wings, and the straight white longitudinal streak, which is produced to the tip. Body pale clay-colour, or pale greyish clay-colour. The pointed palpi are clothed with long thick hair to the tip, and are

recurved over the whole thorax, and are paler on the side turned towards the back. Antennæ slender at the tip, so shortly serrated as to appear cylindrical, slightly pubescent. Anal tuft as pale as the legs. Fore wings 5 lines long,* rather narrow, pointed, with the hind margin curving back, pale ochreous-grey, more or less shading into yellowish ochreous, and irregularly sprinkled with scattered black scales. A white longitudinal stripe runs from the shoulder to the tip of the wing; its front edge is irregularly bordered with black, except at the base, and a black transverse streak extending from this border runs nearly across it. The ground colour between this and the costa is rather dark. One specimen has five brown dots along the inner margin, and another has a continuous series of brown particles. Fringes not much paler than the ground colour. Hind wings pointed, but ending much more obtusely than the fore wings; dark brownish. Fringes paler round the tips of the wings, and on the inner margin. Under side unicolorous dark grey-brown, but the abdominal area of the hind wings and the adjacent fringes conspicuously pale. One of the specimens in Staudinger's collection is from Cuba, and the other two are perhaps from Brazil."

This species, having the antennæ shortly serrated, is probably rightly placed in the genus *Anaphora*.

Anaphora bogotensis, n. s. (Pl. VIII., fig. 14).

Palpi recurved, reaching to the posterior edge of the thorax. *Antennæ* stout, strongly serrated. *Head, thorax, and palpi* greyish brown. *Fore wings* greyish brown, blotched and sprinkled with brownish fuscous, a brownish fuscous spot on the end of the cell, another more conspicuous about the middle of the fold, preceded by a smaller one of the same colour, a row of indistinct brownish fuscous spots along the costal margin, others less noticeable along the apical margin, with a line of three extending obliquely inwards from below the apex. *Hind wings* brown, with somewhat paler fringes. *Abdomen* greyish brown; lateral claspers rather wide, slightly depressed, and decidedly concave at the ends; the uncus is double, abruptly angulated above, the angle projecting in an obtuse point, the points or hooks below diverging; at the base of the uncus above is a small supplementary point or protuberance from the end of the same segment. *Exp. al.* 28 mm.

Hab. Eleven males from Zeller's cabinet, collected

* If English lines are intended this would give an expanse of about 21 mm. when measured in the same manner as *A. pusillus*.

at Bogota by Baron von Nolcken, and labelled in Zeller's handwriting, "*Anaphora* sp. bei *scardina*." This species is in appearance almost undistinguishable from the variety of *scardina* described as *popeanella* by Clemens, but the concave ends of the abdominal claspers enable it to be instantly recognised.

Anaphora ferruginea, n. s. (Pl. VIII., fig. 15).

Palpi reaching as far as the posterior edge of the thorax *Antennæ* slightly paler than the palpi, naked, stout, and shortly pectinate anteriorly. *Head, thorax, and palpi* ferruginous. *Fore wings* ferruginous, slightly blotched above the fold and on the cell with fuscous, also sprinkled towards the costal and apical margins with small groups of fuscous scales; fringes purplish fuscous, slenderly tipped with whitish, especially at the anal angle. *Hind wings* brownish. *Abdomen* the same: lateral claspers dilated in the middle, narrowed towards the apex, which is evenly rounded; about their middle on the under side is a tooth-like projection turning inwards and resembling the structure of these organs in the Indian genus *Alavona*, Wlk.; the uncus is double, flattened above, and abruptly angulated, the angle projecting somewhat over and beyond the points; these are triangular when viewed laterally, and are sharply pointed and divergent. *Exp. al.* 31½ mm.

A single male in Zeller's collection, labelled as collected by Baron von Nolcken at Bogota. It is very distinct both in colour and structure from other known species of this genus.

Anaphora popeanella, Clem. (Pl. VIII., figs. 11, 11*a*, 11*b*, 11*c*).

Anaphora popeanella, Clem., Proc. Acad. Nat. Sci. Phil., 1859, 261; Tin. Nor. Amer., 57—8; Gr., Can. Ent., iv., 137 and 143; Z., Bei. z. Kennt., 1873, 215.

A. agrotipennella, Gr., ♂, Can. Ent., iv., 137; ♀, 143 (1872), xviii., 199; Wlsm., Trans. Am. Ent. Soc., x., 167; Murtf., Can. Ent., viii., 185.

A. scardina, Z., Bei. z. Kennt., xxiii., 215—216 (May, 1873).

"*Antennæ of the ♂ distinctly serrated beneath.* Labial palpi dark brownish, whitish? at the tip in the ♀. Thorax dull brownish in the ♂, with the tegulæ tipped behind with grey; whitish? tinged with brown in the ♀. Fore wings brownish

luteous or dull reddish brown, with luteous or yellow along the fold and inner margin; a spot on the disc and one on the middle of the nervules of the same hue, with a dark brown spot on the fold beneath the median vein, most frequently semicircular, with a short dark brown streak at the base on the submedian vein, and another parallel to it beneath the median. The anterior margin striated from the costa with dark brown, with a subterminal row of dark brown spots *above the branches of the median vein*, and the ends of the nervules dotted with the same hue; cilia pale yellowish brown. Hind wings brownish yellow, cilia the same. Exp. al. 12 to 18 lines (= 25½—38 mm). Male and female alike. Texas."

Now, so far as the antennæ and palpi are concerned, Clemens' observation "male and female alike" is certainly misleading. The antennæ of the male are stout and deeply serrated, "with the ends of the articles finely ciliated," as described by him. Those of the female are simple. The lateral claspers are elongate, spoon-shaped, scarcely dilated, and evenly rounded. The uncus double, angulated above, and bent over at right angles, with a conspicuous thickening at the angle.

Mr. Grote, in describing his *agrotipennella*, points out that this differs from *popeanella* as follows:—"*A. popeanella* disagrees with *A. agrotipennella* by, among other characters, its being described as luteous along the inner margin."

An examination of my extensive series shows that both varieties belong to the same species. The anal appendages do not differ, and intermediate variations of colouring are noticeable. There can be no doubt that they differ only in the extension of the pale colour of the fold in the direction of the dorsal margin. In confirmation of this view it is noticeable that both forms are labelled in Zeller's collection "*Anaphora scardina*, Z."; the typical form of *agrotipennella* received from Grote, as well as from Boll from Texas, being placed in the same series, and evidently regarded by Zeller as synonymous.

I have two specimens compared with what was supposed to be the type of *popeanella* at Philadelphia; a third specimen bred by Miss Murtfeldt, and received from her under the the name *agrotipennella*, Gr.; one specimen from Mons. Ragonot from Boll's collection and labelled "*scardina*, Texas"; several similar specimens

from Morrison from North Carolina; in all twenty-two males and one female, including those from the Zeller cabinet. A female in the British Museum, in Grote's collection, measures 38 mm., and in colour and markings resembles the typical form of the male.

Anaphora ornata, n. s. (Pl. VIII., fig. 16).

Palpi recurved, reaching nearly to the posterior margin of the thorax; greyish fuscous, having a speckled appearance owing to the scales being tipped with dirty whitish. *Head and thorax* of the same colour as the palpi. *Antennæ* dull ochreous, stout, and strongly serrated. *Fore wings* brownish fuscous, blotched with whitish ochreous, especially upon and below the fold; slightly beyond the middle of the fold is a conspicuous quadrangular dark fuscous patch, its upper edge blending with the ground colour of the wing above it, its lower edge straight and clearly defined; between this patch and the base of the wing is a smaller dark spot of the same colour, the dorsal margin below the pale ochreous fold is shaded with brownish fuscous, and some small dark spots are evenly distributed along the costal margin; a small ill-defined pale ochreous patch beyond the outer edge of the cell; the whitish ochreous colour of the fold extends in an undulating line above it before and after the quadrangular dark patch; apical vein not forked. *Hind wings* brown; fringes the same. *Abdomen* greyish fuscous; the anal appendages are very peculiar: lateral claspers spoon-shaped and evenly rounded at the ends, tending slightly upwards; the uncus double, curved over, with the points converging at the apex; two supplementary lateral processes extend from the margin of the penultimate segment, and are of even width, but slightly turned up at the ends, reaching to half the length of the uncus. *Exp. al.* 25 mm.

A single male in Zeller's collection, taken by Baron von Nolcken probably in Columbia, but no locality is marked on the specimen. I have received from Mons. Ragonot for examination a specimen from Buenos Ayres, which has a somewhat similar pattern of colouring on the fore wings, but differs completely in the form of the anal appendages.

Anaphora uncigera, n. s. (Pl. VIII., fig. 17).

Palpi overarching thorax and reaching to posterior margin. *Antennæ* pale brownish, strongly serrated. *Head, thorax, and*

palpi pale brown. *Fore wings* pale brown, rounded at the apex; the costa slightly arched, pale brown, sparsely sprinkled with dots of darker brown, especially along the costal margin; the extreme base of the costa dark brown; there is but a slight indication of the usual discal spot; apical vein not forked. *Hind wings* darker than the fore wings, brownish fuscous; fringes inclining to greyish; on the under side the hind wings are paler than the fore wings. *Abdomen* greyish fuscous. The peculiarity of this species consists in the anal appendages: the lateral claspers are narrow at the base, dilated into a wide triangle posteriorly, having a distinct projecting point at their lower apex; the uncus is much bent over, consisting of two very long slender converging points, thickened below their middle with irregular knobs on the outer side. *Exp. al.* ♂, 20 mm.; ? ♀, 23½ mm.

One male and one female in Zeller's cabinet, collected by Baron von Nolcken at Bogota. The form of the uncus distinguishes this species from all its known congeners.

The female, if I am right in believing it to belong to this species, has the palpi projecting forward about 1½ mm., not recurved. The spot at the end of the cell more apparent than in the male.

Anaphora tenuis, n. s. (Pl. VIII., fig. 18).

Palpi recurved, reaching as far as the posterior edge of the thorax; fuscous at the sides, tending to ochreous or brownish ochreous beneath (the under side being turned upwards their paler colour renders them conspicuous). *Antennæ* brownish ochreous, serrated, the end of each article fringed with slender hairs. *Head and thorax* purplish fuscous. *Fore wings* purplish fuscous, with scarcely any markings; such as there are in some specimens consist of a dark spot on the disc, and a larger one on the fold preceded by a darkish patch; in one variety collected by Boll in Texas, which I believe to belong to this species, the dark spot on the fold assumes the form of a rather conspicuous triangular blotch. *Hind wings* brown, with scarcely paler fringes. *Abdomen* the same; much more slender than in the species allied to *plumifrontella*; lateral claspers somewhat attenuate near the base, elongate-ovate beyond, evenly rounded at the ends; the uncus is curved over, not angulated, the two points very short, slightly diverging, with a pair of small supplementary lateral processes at its base. *Exp. al.* 24 mm.

Seven males from North Carolina, collected by Morrison; there is also a single male in Zeller's collection without locality.

Anaphora macrogaster, n. s. (Pl. VIII., figs. 19, 19 *a*).

Labial palpi, ♂, recurved, reaching nearly to the posterior edge of the thorax; ♀ erect, reaching somewhat above the elongate basal joint of the antennæ. *Antennæ* ♂, bipectinate, the pectinations wider at their bases than outwardly, fringed with short hairs; subochreous; ♀ simple. *Head, thorax, and palpi* mottled greyish and brownish fuscous. *Fore wings* brownish fuscous, slightly mottled with paler along the costal and apical margins; with an elongate patch of dull whitish running irregularly along the length of the fold; a smaller spot of the same colour immediately beyond the outer end of the cell. *Hind wings* brown; the fringes scarcely paler. *Abdomen* the same colour as the hind wings, that of the male about 7 mm., of female 10 mm.; the lateral claspers of the male spoon-shaped, scarcely inverted, dilated outwardly, but tapering slightly upwards and rounded at the apex; uncus double, the points parallel and somewhat closely approximate. *Exp. al.* ♂, 22 mm.; ♀, 29 mm.

Three males and three females from Arizona, collected by Morrison.

Felderia, n. g.

Type. *Acrolophus cossoides*, F. & R.

Labial palpi overarching the thorax, roughly clothed with long loose scales. *Maxillary palpi* 3-jointed, rather long and slender. *Antennæ* strongly bipectinate, the pectinations fringed with delicate hairs. *Fore wing*, the form of the wings and neuration as in *Anaphora*. *Abdomen*, lateral claspers of varying form, more or less spoon-shaped.

Tabulation of Species of Felderia, *Wlsm.*

A. Uncus single = *pygmæa*, Wlsm.
B. Uncus double.
  a. Lateral claspers squared at the ends = *doeri*, Wlsm.
  b. Lateral claspers rounded at the ends.
    I. Uncus abruptly bent over = *maculatus*, Wlsm.
    II. Uncus not abruptly bent over.
      1. Lateral claspers spoon-shaped, tapering posteriorly = *filicicornis*, Wlsm.
      2. Lateral claspers with edges parallel, not tapering posteriorly = *cossoides*, F. & R.

Felderia doeri, n. s. (Pl. VIII., figs. 20, 20 *a*, 20 *b*).

Labial palpi overarching the thorax, and reaching beyond its posterior margin. *Antennæ* subochreous, strongly bipectinate, the pectinations fringed on both sides with slender hairs. *Head, thorax, and palpi* mottled cinereous and greyish brown. *Fore wings* cinereous, blotched and mottled with greyish brown throughout; the costa obscurely spotted with fuscous from base to apex; a conspicuous brownish fuscous spot at the end of the cell, a more conspicuous spot of the same colour beyond the middle of the fold, preceded by a smaller one also on the fold. Under side with a slight ochreous tinge about apex and apical margin. *Hind wings* cinereous-brown. *Abdomen* greyish brown; anal tuft paler; the lateral claspers of peculiar form, being thickened at the base, attenuated and abruptly arched upwards in the middle, with the dilated spoon-shaped apex depressed and terminated in several small tooth-like processes, evidently adapted for firm grasping; the uncus is double, curved, but with the points parallel and closely approximate.

Received from Herr H. Doer; Petropolis, near Rio Janeiro, Brazil. Five males in my collection.

Felderia maculata, n. s. (Pl. VIII., fig. 21).

Palpi overarching the thorax and reaching to its posterior edge. *Antennæ* subochreous, strongly bipectinate, the pectinations fringed with slender hairs. *Head, palpi, and thorax* dull umber. *Fore wings* dull umber, with a few brownish ochreous scales at the base of the fold and costal margin; a conspicuous whitish ochreous patch occupies the apical portion of the wing, reaching to the middle of the apical margin; a projecting point of umber scales encroaches upon it from the costa at its inner edge; a few whitish ochreous scales are scattered throughout the umber fringes. *Hind wings* umber-brown, slightly paler than the fore wings. *Abdomen* the same; the lateral claspers are dilated from their base upwards, but of equal width beyond it; they are rounded at the apex, and indented along their inner edge; the uncus is abruptly angulated above, the two points being very long and reaching straight downwards to beyond the ends of the claspers; they are closely approximate and parallel, except at their extreme points, which are slightly divergent. *Exp. al.* 35 mm.

Hab. Two males received from Herr H. Doer from Petropolis, near Rio Janeiro, Brazil.

Felderia filicicornis, n. s. (Pl. VIII., figs. 22, 22 *a*).

Labial palpi strongly recurved, reaching to the posterior margin of the thorax. *Antennæ* strongly bipectinate, the pectinations being slightly narrower at their bases, wider outwardly, subochreous. *Head, thorax, and palpi* thickly clothed with fuscous hair-like scales, tipped with hoary white. *Fore wings* mottled greyish and brownish fuscous; about twelve brownish fuscous ill-defined dots along the costal margin, not arranged in pairs, but distributed at approximately equal distances; a brownish fuscous spot at the end of the cell, from which a streak of the same colour extends obliquely downwards to the anal angle; fringes greyish fuscous, speckled with whitish. *Hind wings* brownish, with a faint purplish tinge; fringes pale greyish brown. *Abdomen* brownish. *Under side of all the wings* pale cinereous, the costal margin of the fore wings not defined by a pale line as in *arizonella*. *Exp. al.* ♂, 26 mm.; ♀, 27—31 mm. The lateral claspers of the male spoon-shaped, widened in the middle, tapering outwardly, and rounded at the apex; the uncus double, the two points parallel, shorter and wider apart than in *arizonellus*.

Hab. One male and five females from Arizona, collected by Morrison.

This species has much the appearance of *arizonella*, Wlsm., but the peculiar form of the antennæ in the male at once serves to distinguish it.

Felderia cossoides, Rog. (Pl. VIII., fig. 23).

Feld. and Rog., Nov., t. cxxxix., f. 35.

A single specimen of this species in Zeller's collection is in poor condition, scarcely admitting of any description of the markings. No description is published with the figure, the only remark made being "*Pinaris hamiferella*, Hb., Zutr., 441, etiam hujus generis esse videtur." The figure represents a not very dark reddish brown species with hind wings approximately the same colour as the fore wings, with a dark spot on the end of the cell, and another before and below it lying above the commencement of the outer third of the fold; there is also a series of small darkish spots around the costal and apical margins, the palpi rather paler than the wings, and the antennæ obviously pectinate.

In all these particulars Zeller's specimen may fairly

be taken to agree, so far as its condition enables a comparison to be made. The antennæ are very strongly bipectinate, each tooth fringed with slender hairs on both sides. The lateral claspers are elongate, evenly rounded at the end, and of even width throughout, so far as they can be seen beyond the terminal segments of the abdomen. The uncus is double, with the points parallel, but not closely approximate. It measures 32 mm. in the expanse of the fore wings.

The specimen figured by Rogenhofer came from Ypanema, and was collected by Natterer; the label on Zeller's specimen shows that it came from the same locality.

Felderia pygmæa, n. s. (Pl. VIII., figs. XX, XX*a*).

Palpi recurved, overarching the thorax, clothed with long mixed cinereous and brownish fuscous scales. *Antennæ* strongly bipectinate, the pectinations placed widely apart, fringed with slender hairs. *Head and thorax* cinereous, strongly shaded with brownish fuscous. *Fore wings* with the costa somewhat arched; the apex depressed, rounded; the apical margin oblique, ground colour cinereous, suffused with brownish fuscous, the darker shades of which are concentrated along the costal margin and in four separate patches on the wing-surface; the first of these is situated at one-third from the base on the costal half of the wing, a smaller patch of the same colour lying below it beneath the fold; beyond this, near the middle of the dorsal margin, is a similar patch, a more conspicuous one being placed on the outer end of the discal cell; each of these patches is followed by a few scales of the pale cinereous ground colour of the wing; there are also some few inconspicuous dark spots upon the apical portion of the wing and about the apical margin, but none of the markings are clearly defined. *Hind wings* pale brownish fuscous. *Abdomen* the same, slightly darker posteriorly; lateral claspers slender, somewhat dilated and upturned posteriorly; uncus curved, single. *Exp. al.* 12 mm.

A single male from Goya, Corrientes, Argentine Republic, collected and sent to me by Mr. L. K. Perrens. This species is particularly interesting, as showing that the genus *Felderia*, characterised by its pectinate antennæ, like its near allies *Anaphora* and *Acrolophus*, is represented by species of minute size.

ORTHOLOPHUS, n. g.

(Ορθος = straight, λοφος = crest).

Type. *Orthalophus variabilis*, Wlsm.

Labial palpi, ♂, erect, not recurved over the head, the joints thickly clothed; ♀ porrected. *Maxillary palpi* short, depressed. *Antennæ* simple, or slightly serrated. *Ocelli* none. *Fore wings* elongate, narrower in proportion to their length than in *Anaphora* or *Acrolophus*; neuration as in *Acrolophus*; apical vein of the fore wing not forked; uncus single or double.

Orthalophus variabilis, n. s. (Pl. VIII., figs. 24, 24 *a*, 24 *b*, 24 *c*).

Labial palpi, ♂, erect, not recurved, dirty whitish, more or less tinged with greyish fuscous, with which they are sometimes entirely suffused, about 3½ mm. long, separately tufted on each joint; ♀ porrect, standing out about 2 mm. beyond the head. *Antennæ* subochreous; ♂ serrated; ♀ simple. *Head, thorax, and fore wings* dirty whitish, sprinkled and suffused with greyish fuscous, varying with the colour of the fore wings. *Fore wings* elongate, narrow, the costa slightly rounded, apex rounded, apical margin oblique, convex, presenting several varieties of colouring; apical vein not forked. Var. *α*. dirty whitish, mottled along the apical and costal margins with greyish fuscous; a triangular fuscous patch overlapping the fold, and more or less connected with a spot of the same colour at the end of the cell; fringes mottled alternately greyish fuscous and dirty white both in fore and hind wings. Var. *β*. greyish fuscous, with scarcely any admixture of whitish scales, the darker fuscous patches distinctly visible, and a few brownish ochreous scales on the disc. Var. *γ*. pale greyish fuscous, the dark patches almost obsolete, with no admixture of whitish scales, except in the fringes. *Hind wings in all the varieties* brownish, with a slight purplish tinge; the fringes scarcely paler. *Abdomen* pale greyish fuscous; lateral claspers of nearly even width from the base outwards, slightly angulated downwards about their middle, the ends rounded, but more so below than above; uncus single, evenly bent over, but very little longer than its opposing branch coming from beneath it. *Exp. al.* ♂, 24—27 mm.; ♀, 30—34 mm.

I have a considerable series of this species collected by Morrison in Arizona, and had always regarded it as equivalent to *mortipennella*, Gr., the only described species with whitish fore wings and darker hind wings;

but Mr. Grote's remark that in his species the labial palpi reach as far back as the dorsum of the thorax proves that it is distinct.

PSEUDANAPHORA, n. g.

Type. *Anaphora arcanella*, Clem.

Labial palpi ascending, not recurved to the thorax. *Maxillary palpi* scaled, 3-jointed, of moderate length. *Antennæ* simple, or slightly serrated towards their apex. *Fore wings* with the costa scarcely arched, of approximately even width throughout, except at the extreme base; the apical margin oblique, slightly convex; the apical vein not forked. *Hind wings* slightly wider than the fore wings, with the costal margin arched; apical vein not forked; uncus double.

The single species known to Dr. Clemens was placed by him in his genus *Anaphora*, although differing very widely from the other types of the genus in the form of the labial palpi; these, as noticed by that author, are shorter than in other species of *Anaphora*, and, according to his description, are "ascending but not recurved." I find the second joint is somewhat recurved, so that, although the palpi have an erect appearance, they differ considerably from those of *Orthologhus*, in which the first joint is so long as to enable the other two to stand erect above the head. Although the second joint is absolutely straight, Clemens' *Anaphora arcanella* differs also in structure from my genus *Neolophus* by having the apical vein of the fore wings not forked, although in other respects it greatly resembles it. I have a second species obviously belonging to this genus, represented by a single specimen in Zeller's collection from North America, but without a special locality label. It differs from *arcanella* chiefly in the form of the anal appendages, and in the greater width of the fore wings. The specimen is not in good condition.

Pseudanaphora arcanella, Clem. (Pl. VIII., fig. 25).

Anaphora arcanella, Clem., Proc. Acad. Nat. Sci. Phil., 1859, 262; Tin. Nor. Am., 57, 58, 60; Gr., Can. Ent., iv., 143; Chamb., Bull. U. S. Geol. and Geog. Survey, iv., 79; Wlsm., Trans. Am. Ent. Soc., x., 167.

"*Labial palpi shorter in the ♂ than in the preceding* (*popeanella* and *plumifrontella*) *ascending, but not recurved.* Palpi luteous-brown in front, dark brown externally. Thorax dark brown, almost blackish. Fore wings dark brown, with an obscure purplish hue; with luteous-brown on the disc and in the fold, interrupted by a blackish brown, nearly square, submedian spot in the fold, and a small one near its base of the same hue,—sometimes merely a few blackish brown scales,—with an irregular blackish brown spot on the end of the disc, and the costa and apical portion of the wing dusted and dotted, sometimes striated with blackish brown. Hind wings dark brown, tinged with black. Exp. al. 12 lines (= 25 mm.). Female not known."

To this may be added :—Antennæ slightly serrated towards apex. Fore wings with 12 veins, all separate; apical vein not forked. Hind wings 8 veins, also separate, 7 and 8 parallel. Lateral claspers slender, widening slightly towards their posterior extremities, which are rather square. Uncus double, rather abruptly bent over, but not angulated, the points parallel, separated by about the width of one of them.

STŒBERHINUS, *Butl.*, Ann. Mag. N. H., April, 1881, 402.

Type. *Stœberhinus testaceus*, Butl.

"*Urbaræ* affine genus *Ypsolopho** simile, differt autem palpis maris permagnis crassis, scopis terminalibus expansis, feminæ palpis simplicibus longulis porrectis; antennis crassis."

"The development of the male palpi in this genus is considerably greater than in the little South American genus to which Walker has given the name of *Urbara*: this organ curves upwards far above the head in *Stœberhinus*, and is broadly fringed at the back, so as to present the appearance of a hearth-broom."†

Stœberhinus testaceus, Butl.

Butl., Ann. Mag. N. H., April, 1881, 402—3.

"Primaries above pale testaceous; six dark brown spots arranged in pairs, two at the base, two just beyond the basal third, the fifth (which is largest) just below the end of the cell, and the sixth in an oblique line with it on the dorsal margin; two or three widely

* "Y. *verbascellus* especially."

† "The development is quite different from that in *Anaphora*, being quite slender and only emitting divergent bristles from the back of the last joint."

separated brown costal spots, and an arched series close to the outer margin; a slender brown marginal line, and a paler line near the base of the fringe, beyond which it (the fringe) is almost pure white; secondaries silvery white, with faint cupreous reflections; an indistinct marginal testaceous line; body testaceous; palpi with the terminal bristles dark brown; abdomen silvery at the base. Primaries below greyish testaceous, with a narrow buff-coloured border; fringe silvery; secondaries with greyish testaceous costal area; otherwise as above; body below shining golden buff. Expanse of wings, 6 lines. A pair. Honolulu."

The antennæ are simple, not serrated.

Explanation of Plates VII. & VIII.

PLATE VII.

Fig. 1. *Neolophus furcatus*, Wlsm.; 1*a*, head of ♂; 1*b*, terminal appendages of ♂.
Eulepiste maculifer, Wlsm.; 1*c*, head of ♂; 1*d*, head of ♀.
2. *Hypoclopus griscus*, Wlsm.; terminal appendages of ♂; 2*a*, side view of head of ♀; 2*b*, neuration of fore wing.
3. *Thysanoskelis hirsutus*, Wlsm.; 3*a*, head of ♂; 3*b*, tarsal joints of hind leg; 3*c*, terminal appendages of ♂.
4. *Ankistrophorus corrientes*, Wlsm.; 4*a*, head of ♂; 4*b*, terminal appendages of ♂.
5. *Acrolophus plumifrontellus*, Clem., ♂; 5*a*, head of ♂; 5*b*, head of ♀; 5*c*, terminal appendages of ♂; 5*d*, terminal appendages of ♀; 5*e*, neuration of fore wing.
6. *A. cervinus*, Wlsm.; head of ♀.
7. *A. simulatus*, Wlsm.; terminal appendages of ♂.
8. *A. argentinus*, Wlsm.; ,, ,, ,,
9. *A. texanellus*, Chamb.; ,, ,, ,,
10. *A. arizonellus*, Wlsm.; ,, ,, ,,
X. *Cænogenes perrensellus*, Wlsm.; antenna of ♂; X*a*, terminal appendages of ♂.

PLATE VIII.

FIG. 11. *Anaphora popeanella*, Clem.. ♂; 11*a*, head of ♂; 11*b*, head of ♀; 11*c*, terminal appendages of ♂.

12. *A. morrisoni*, Wlsm.; terminal appendages of ♂.

13. *A. pusilla*, Z.; ,, ,, ,,

14. *A. bogotensis*, Wlsm.; ,, ,, ,,

15. *A. ferruginea*, Wlsm.; ,, ,, ,,

16. *A. ornata*, Wlsm.; ,, ,, ,,

17. *A. uncigera*, Wlsm. ,, ,, ,,

18. *A. tenuis*, Wlsm.; ,, ,, ,,

19. *A. macrogaster*, Wlsm., ♀; 19*a*, terminal appendages of ♂.

20. *Felderia docri*, Wlsm.; 20*a*, head and antennæ of ♂; 20*b*, terminal appendages of ♂.

XX. *F. pygmæa*, Wlsm.; terminal appendages of ♂; XX*a*, antenna.

21. *Felderia maculata*, Wlsm.; terminal appendages of ♂.

22. *F. filicicornis*, Wlsm.; terminal appendages of ♂; 22*a*, antenna of ♂.

23. *F. cossoides*, F. & R.; terminal appendages of ♂.

24. *Orthologhus variabilis*, Wlsm., ♂; 24*a*, head of ♂; 24*b*, head of ♀; 24*c*, terminal appendages of ♂.

25. *Pseudanaphora arcanella*, Clem.; terminal appendages of ♂.

X. *Description of a new genus of* Rhopalocera *allied to* Anteros, *Hew.* By George T. Baker, F.E.S.

[Read March 2nd, 1887.]

Plate IX.

Ourocnemis, n. g.

Head very prominent, square, with collar. Palpi deflexed. Body robust. The three pairs of legs stout, with long hairy tufts, the second pair having very long tarsal tufts. Neuration as usual, *viz.*, costal vein short, extending to not over a third of the costa; subcostal vein quadriramose, the first two branches emitted before the end of the cell, the last two making a long fork to the costa just in front of apex; upper radial emitted from anterior angle of cell, lower radial from centre of cell; median and posterior veins normal. Hind wings with quite normal neuration. Fore wings subfalcate; hind wings deeply excavated between the first median branch and submedian vein, with fringe lengthened into a caudal appendage at the extremity of the latter.

I have two female specimens of this insect from Goya, Corrientes, South America, and at first thought it was altogether new; but, with the kind assistance of Mr. Osbert Salvin, I now find it to have been placed by Hewitson in the Erycinid genus *Anteros*, and named *axiochus*. Though somewhat nearly allied to *Anteros*, the structure and clothing of the palpi preclude it being placed in that genus, and necessitate the formation of a new one.

Hitherto the only sex that appears to have been known in this country was the male, from a poor specimen of which Hewitson took his description; and, as this differs somewhat from my females, it may be as well to describe them in detail.

Ourocnemis axiochus, Hew. (Pl. IX., figs. 1 & 2).

The entire upper surface of all the wings is sooty black, with a very faint bluish lustre over the basal half. Fringes of same

colour, but with the extremities tipped with white. Body and thorax same hue as the wings. Expanse, 36 mm.

Under surface, ♀: Fore wings black-brown, with a large costal yellow spot near the base, and a second of the same colour extended transversely over the end of cell; between these spots, at the base, and near the costa beyond the cell, are three shining plumbageous markings; costal and external borders at apex yellowish, with a subapical tawny suffusion; posterior margin and fringe black, divided by a plumbageous stripe, with an ill-defined plumbageous submarginal patch near the centre of outer border. Hind wings with base of costa yellow, divided by a transverse black c-shaped dash, a large triangular black patch occupying the subbasal area, crossed by a ⋀-shaped silvery mark; the whole centre of the wing being occupied by a very irregular belt of sandy ochraceous irrorated with grey, and bounded externally by an irregular blackish belt, suffused externally with plumbageous. Margin of fringe black, divided by a plumbageous stripe. Body blackish, with scattered shining plumbageous scales. Antennæ rusty reddish, with base of club blackish; legs black and lustrous, stout and very hairy, with the extremities of tarsi ochraceous.

The irregular belt of sandy ochraceous on the under surface of the hind wing is entirely wanting in the male sex.

Explanation of Plate IX.

Fig. 1. ♀ imago of *Ourocnemis axiochus*, upper surface.
2. ♀ ,, ,, ,, under surface.
3. Neuration of wings.
4. Head, front view.
5. ,, profile.
6. Palpi (magnified).
7. ,, showing structure of ♂ (magnified).
8. Legs (magnified).
9. Structure of fore leg of ♂, showing how the coxa is produced beyond the coxo-trochanter joint; together with the imperfect tarsus; both typical of *Erycinidæ*.

XI. *New genera and species of* Buprestidæ.

By Charles O. Waterhouse.

[Read May 4th, 1887.]

Whilst I have been engaged in determining the *Buprestidæ* of Central America, I have found it necessary to propose several new genera. Some of them are not founded on Central American species, and I have therefore thought it best to publish them in the present paper, as they cannot conveniently be inserted in the 'Biologia Centrali Americana.'

Mixochlorus, n. g.

Antennal pores in a cavity on the lower internal margin of the joints. Scutellum small, transverse, trapezoidal. Sternal cavity formed by the meso- and meta-sterna. Head gently convex in front. Antennal cavities small, round. Thorax a little broader than long, not much narrowed anteriorly, with three longitudinal impressions above; the central one extending from the base to the front margin, broader at the base than in front; the lateral impressions do not reach the anterior margin. Posterior angles acute, scarcely diverging. The base gently bisinuate. Elytra at the base as broad as the thorax, scarcely sinuate at the sides, gradually narrowed to the apex; punctate-striate; longitudinally impressed at the suture. Tarsi short, the basal joint about as long as the two following joints together. Claws angularly dilated at the base beneath.

The species for which I propose this genus might at first sight be taken for one of the *Agrilidæ*. It is, however, clearly allied to *Agæocera* (Waterh., Biologia Cent. Amer., Coleopt., iii., pt. i., p. 4), and should be placed near *Pelecopselaphus*. It differs from *Agæocera* in its narrower form; the elytra are not costate, and the claws are dilated at the base.

Mixochlorus suturalis, n. s.

Læte aureo-viridis, crebre punctulatus; fronte, thoracis elytrorumque vittis duabus rufo-cupreis. Long. 13 mm.

Head densely punctured, gently convex; the forehead reddish coppery, with a green median line on the vertex. Thorax rather straight at the sides, a little narrowed in front, broadest at the posterior angles, which are acute; rather strongly and moderately closely punctured on the raised parts, densely punctured in the impressions. Scutellum green. Elytra somewhat strongly punctate-striate; the suture with a broad green stripe, which is impressed, finely rugulose and punctured; the two interstices next to the green stripe finely and not very closely punctured, the lateral interstices closely and finely strigose. The extreme margins green; the epipleural dilatation at the base blue. Prosternum very strongly punctured; the abdomen rather less strongly and less closely punctured, the apex semicircularly emarginate.

Hab. Honduras (Brit. Mus.).

Note.—There is a species of *Agrilus* from Mexico, which so much resembles this that it might at first sight be mistaken for it. The thorax is, however, uniform in colour, and the punctuation of the elytra is not in lines.

Peronæmis, n. g.

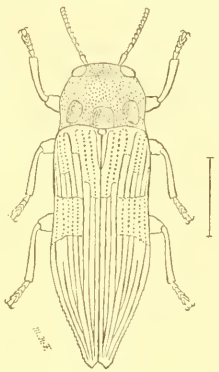
Form nearly that of *Cinyra albonotata*, but with the thorax more convex and more parallel at the sides. Antennal pores anterior. Scutellum transverse and trapezoidal. Sternal cavity formed by the meso- and meta-sterna. Basal joint of the posterior tarsi scarcely as long as the 2nd and 3rd together. Head slightly convex; antennal cavities small and round. Thorax a little broader than long, very convex anteriorly; with three rather deep ovate impressions at the base; the posterior angles slightly diverging and acute. Elytra as broad as the thorax, subparallel for two-thirds their length (slightly sinuate at the sides), gradually and obliquely narrowed at the apex; the apex of each elytron angular in the middle. First and second segments of the abdomen separated by a suture. The lateral line of the thorax runs obliquely downwards and vanishes in front.

Peronæmis thoracicus, n. s.

Elongatus, subnitidus; capite viridi, medio rufo-cupreo; thorace læte rufo-cupreo, crebre sat fortiter punctato, basi infuscato;

scutello cyaneo, nitido; elytris æneis, fortiter striatis, plaga scutellari, altera ad medium (ad suturam non attingenti) brunneo-æneis nitidis. Long. 10½ mm.

The head is closely and moderately strongly punctured. The thorax is rather more strongly punctured; the three basal impressions extend nearly to the middle, the central one is rather wider than the others; they are slightly tinted with bluish green at the base. The suture of the elytra is green; the interstices are slightly costiform, except below the shoulder and near the suture in the middle. There is a quadrangular patch occupying the scutellar region, and a second square spot about the middle of a more brown colour, more shining, and slightly more raised than the rest of the elytra; the humeral callosity and the margin near the base are also of the same bronzy-brown colour; the margins near the apex are finely denticulate. The sterna, abdomen, and legs are bluish green, varied with blue, purple, and æneous.



Hab. Jamaica.

Trypantius, n. g.

I propose this name for *Stenogaster bitæniatus*, Chev., and an allied species. The chief character of *Stenogaster* is the somewhat remarkable fact that only the 4th joint of the tarsi is furnished with a lamina; it is therefore quite inadmissible that *S. bitæniatus*, which has the 2nd and 3rd joints also furnished with a short lamina, should be included in the genus. The costa of the elytra does not reach the base, which is the case in *Stenogaster*; the forehead has a deep longitudinal furrow, and the channel on the inner margin of the eye is also very deep.

Trypantius infrequens, n. s.

Elongatus, angustus, depressus, æneus, nitidus, crebre punctatus, parce griseo-pubescens, pube ante apicem elytrorum in fasciis duabus congesta. Long. 10 mm.

Very similar in form to *T. bitæniatus*, but narrower and more regularly narrowed posteriorly. Head moderately strongly and

closely punctured, the frontal furrow deep and clearly defined. Thorax longitudinally impressed in the middle, declivous and impressed at the sides, somewhat closely punctured, the punctures very irregular in shape and size; close to the margin there is a ridge as in *T. bitæniatus*, but it is not so clearly defined, closer to the margin and more parallel with it. Scutellum strongly transverse, the middle of the posterior margin prolonged into a point. Elytra gradually narrowed from the base to the apex, depressed, closely punctured, the punctures not clearly defined and irregular in size. Each elytron has an obtuse costa, commencing about one-third from the base, and nearly extending to the apex; the apex is obtuse and slightly serrated. There are two rather indistinct fasciæ of whitish pubescence, the upper one directed upwards at the suture. Prosternal process closely and finely punctured: the middle of the metasternum shining and more sparingly punctured. All the under surface is sparingly clothed with whitish pubescence.

Hab. Mexico (coll. Brit. Mus.).

Cyphothorax, n. g.

Intermediate between *Stenogaster* and *Agrilus*. Head gently concave, deeply channelled between the eyes. Thorax transverse, narrowed in front of the middle; the disk in the middle with an elevated swelling. Scutellum nearly equilaterally triangular. Elytra somewhat flat, subparallel, obliquely narrowed at the apical third; irregularly punctured, with scarcely any trace of lines. Tarsi moderately short, the basal joint of the posterior pair about as long as the two following joints together; the 2nd and 3rd joints are furnished below with a pilose pad, but have no distinct lamina; the 4th joint has a lamina as in *Stenogaster*.

I propose this genus for *Stenogaster palleolatus*, Chevr.

Autarcontes, n. g.

I proposed this name for *Agrilus mucoreus*, Klug, and some allied species. The thorax is broad and transverse, with an angular prominence at the sides close to the base. The elytra are somewhat parallel for two-thirds their length, and then obliquely narrowed to the apex; the apex of each elytron truncate or slightly sinuate. Each elytron has an obtuse costa for two-thirds its length, the dorsal space between them more or less flat. The basal joint of the posterior tarsi in *A. mucoreus* is short; the other species show a gradation to the longer tarsi of ordinary *Agrilus*.

The four species which I propose to associate, although differing in the length of the posterior tarsi, appear to me to form a natural group, for which it is convenient to have a name as distinct from *Agrilus*.

Autarcontes planus, n. s.

Elongatus, sat latus, dorsum planatus, æneo-niger, subtus cyaneus; elytris ante apicem guttulis numerosis griseis ornatis. Long. 13—14 mm.

Black above, slightly tinted with æneous (sometimes with violet). Forehead deeply incised between the eyes. Thorax twice as broad as long, broadest just before the base, narrowed anteriorly; rather flat above, with a shallow double impression at the base; obliquely declivous at the sides and irregularly impressed; irregularly and not very closely punctured. Scutellum gently concave, smooth; transverse, with the middle of the posterior margin produced into a point. Elytra flat on the back, and very closely punctured; sides beyond the costa, and the apex more shining and less closely and more irregularly punctured. A few small greyish spots are scattered over the surface, but in the apical region they are more numerous. The apex of each elytron is truncate, slightly sinuate, the outer angle very acute. Prosternal process and metasternum strongly punctured; the abdomen much less strongly punctured. Posterior tarsi short.

Hab. Para and Nauta, Amazons (*Bates*); Bahia.

Autarcontes pictiventris, n. s.

Statura *A. mucorei*, Kl., magis tamen elongatus, depressus, niger, opacus; elytris pube grisea irroratis; corpore subtus cyaneo, nitido, abdomine maculis coccineis utrinque ornato. Long. 18 mm.

Thorax short and broad, obliquely narrowed in front, flattened (or very slightly concave) on the disk, declivous and impressed at the sides; the angle at the side near the base is very prominent and very acute. Elytra relatively much longer than in *A. mucoreus*, flattened dorsally; densely punctured; with numerous vermiculate greyish marks; two bands behind the middle and the apex are almost without spots. The red spots on the last three segments of the abdomen are quadrate, with an oval smooth space at the base. The apex of each elytron is truncate and slightly emarginate; the outer angle acute. Posterior tarsi rather long.

Hab. Amazons, Santarem.

Autarcontes abdominalis, n. s.

Niger; elytris inter costas æneascentibus immaculatis, fascia anguste ante apicem e pube grisea ornatis; corpore subtus cyaneo, maculis coccineis utrinque ornato. Long. 17 mm.

This species much resembles the preceding, and has the thorax acutely angular at the sides in the same way, closely punctured. The impression on the disk, which in the preceding species is somewhat trefoil in shape, is more distinctly divided into three impressions, of which the anterior one is small. The dorsal region of the elytra is slightly tinted with brassy; the sides and apex black, the apex with a fascia of grey pubescence. The red spot on the basal (2nd) segment of the abdomen is large and transverse; those on the three following segments are a little smaller (but larger than in the preceding species), each with a smooth oval spot at the base. Posterior tarsi long.

Hab. Nicaragua, Chontales (*T. Belt*).

Omochyseus, n. g.

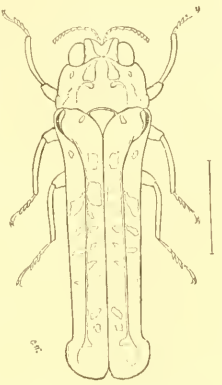
General characters of *Agrilus*. Thorax transversely quadrate, deeply excavated on the disk. Scutellum triangular, broad at the base, gradually acuminate. Elytra not much narrowed posteriorly, each with a single costa; the shoulders much elevated into a sort of curved costa; the apex suddenly obliquely inclined, forming a distinct but obtuse angle with the dorsal line of the elytra.

I propose this name for a Brazilian insect closely allied to *Agrilus*, but which, from its peculiar form, I think merits generic distinction; the chief characters being the much elevated shoulders of the elytra, and the suddenly inclined apex.

Omochyseus humeralis, n. s.

Niger, vix purpurascens; pectore abdomineque cyaneis, pedibus cupreis; capite profunde excavato; thorace transverso, quadrato, disco fortiter impresso, transversim strigoso, antice guttis duabus elevatis nitidis instructo; lateribus declivibus rugulosis, guttis duabus nitidis elevatis instructis; scutello elongato triangulari; elytris sicut griseo-marmoratis, confertim subtiliter punctatis, guttis numerosis irregularibus parum elevatis nitidis seriatim dispositis, fascia post-medium nigro-velutina; apice ipso inclinato utrinque arcuatim paulo dilatato; singulo elytro unicostato; humeris bene elevatis. Long. 11½ mm.

The head is closely punctured, with a deep shining excavation between the eyes. The elytra at the base are as broad as the thorax, narrowed slightly just below the shoulders, and then subparallel to the expanded apex. The shoulders are elevated into a short curved costa, deeply impressed within; the usual costa reaches from the shoulder to the apical declivity. The prosternal process is closely and very coarsely punctured. The middle of the metasternum is brassy. The abdomen is not very closely punctured.



Hab. Brazil, Santa Martha.

Since the above was written I have seen M. J. Thomson's description of *Agrilus omocyrius* (Typi, Append., p. 58), and think it possible that they may refer to the same species. In that case, however, M. Thomson's description appears incorrect. The shoulders of the elytra do not project, but are elevated. The elytra have a black fascia before the middle and a second behind, not two behind the middle. The prosternum is not striolate, but deeply punctured.

Omochyscus terminalis, n. s.

Præcedenti similimus; thoracis lateribus postice minus angulatis, plagis discoidalibus elevatis punctatis; elytrorum costa ante apicem evanescenti, apice haud dilatato. Long. 12 mm.

This species very closely resembles the preceding. The thorax is, however, less angular at the sides, but especially the raised spot on each side of the front of the disk, instead of being smooth, is coarsely punctured. The costa on the elytra does not quite reach the apical declivity. The apical declivity is slightly cyaneous, transverse, somewhat trapezoidal in outline, not dilated and rounded on the outer side.

Hab. Mexico, Oaxaca.

Paradomorphus, n. g.

I propose this name for *Agrilus frontalis*, L. & G., and some allied species, which differ from *Agrilus* in having the basal joint of the posterior tarsi comparatively short.

Paradomorphus albicollis, n. s.

Niger, hic et illic æneo-tinctus; capite quadrinodoso; thorace transverso, subquadrato, dense albo-tomentoso; elytris unicostatis, basi cyaneo-æneis, medio æneis, ad apicem nigrescentibus; apice ipso albomaculato. Long. 9½ mm.

The head has four nearly equal round nodes, the two anterior ones æneous. The thorax is evenly convex, nearly straight at the sides; the basal median lobe broadly truncate. The elytra at the shoulders are as broad as the thorax, gently sinuous at the sides, obliquely narrowed at the apical third; densely punctured; the base impressed; the shoulders elevated; the apex of each elytron rounded and denticulate. Besides the apical chalky white spot there are three small pale grey pubescent spots between the suture and the costa, and behind the middle there is a narrow flexuous greyish fascia, which does not reach the suture. The 2nd segment of the abdomen (united with the 1st) broad and swollen. The antepenultimate and apical segments each with a conspicuous white spot on each side.

Hab. Jamaica (Brit. Mus.).

XII. *On* Pyralidina *from Australia and the South Pacific.* By E. Meyrick, B.A., F.E.S.

[Read June 1st, 1887.]

As the discovery or recognition of additional species in this group, and of additional synonyms for known species, continues to make progress, I hope from time to time to publish such notes and descriptions as will keep the knowledge of the subject up to date. The present paper is a collection of such notes; but before proceeding to their systematic consideration I desire to call attention to the identification of the species of this group in the paper by Mr. Butler, published in the 'Transactions' of this Society for 1886, pp. 420 *sqq.*, and treating specially on Lepidoptera from these regions. In doing so I hope not to appear discourteous; I am much indebted to Mr. Butler for the courtesy with which he has assisted me to examine the types of these and other species; and it is also only just to point out that his paper was read before mine, published earlier in the same volume, was in print, and he therefore had not the opportunity of correctly identifying some of the Pacific species described therein.

The following are my identifications of the *Pyralidina* described in his paper:—

Aporocosmus bracteatus (described as a Noctuid) is a synonym of *Eurycreon lamprodeta*, Meyr. Mr. Butler himself subsequently made this identification, and was kind enough to call my attention to it.

Microsca plagifera is a variety of *Striglina myrtæa*, Drury (=*fenestrina*, Feld., and *fenestrata*, Gn.), with the spot (which varies very much and is sometimes absent) unusually large.

Pharambara reticulata is a *Sicudodes*; it is a good species, but there is already a *Sicudodes reticula* of Guénée, and I conceive therefore that the name cannot stand; I propose for it the name of *crypsiria*, by which it is already known in Australian collections.

Graphicopoda hecate is a synonym of *Erebangela melanauges*, Meyr.

Pseudephyra straminea belongs to the *Noctuina*.

Niphadaza bicolor is a synonym of *Compsophila iocosma*, Meyr.

Oligostigma pallida is a synonym of *Paraponyx dicentra*, Meyr.

Rinecera nigrescens is a synonym of *Strepsimela signiferalis*, Wallgr.

Hormatholepis erebina is a good genus and species.

Asopia leonina appears a good species, but I was not able to make a sufficient examination to locate it correctly; it is, of course, not an *Asopia*, as generally understood.

Leucophotis pulchra is a good species, and I think genus.

Endotricha annuligera is a synonym of *Semioceros mesochlora*, Meyr.

Endotricha obscura is a synonym (♀) of *Endotricha æthopa*, Meyr.

Rhimphalea arnone is a synonym of *Rhimphalea lindalis*, Walk. (= *sceletalis*, Ld.).

Pterygisus ochreipennis is a species of *Eurycreon*, vid. infr.

Gonocausta asuridia is a *Siculodes*; a good species.

Margaronia limbata appears to be a good species of *Margarodes*.

Botys horatius is a synonym of *Pleonectusa parallela*, Meyr.

Botys argyrogaster is a synonym of *Dracænura pelochra*, Meyr.

Emprepes insignis is a synonym of *Deuterarcha xanthomela*, Meyr.

Scopula auritincta is a *Conogethes*; a good species.

Nymphula sordida is a synonym of *Tritæa ustalis*, Walk. (= *turbidalis*, Walk., and *affinitalis*, Ld.).

Salebria squamicornis is a synonym of *Epicrocis cucometis*, Meyr.; a pale specimen.

Mella arenosa is apparently a good species, but in the absence of the male the genus must be considered doubtful.

Anerastia niteus is a synonym of *Heosphora psamathella*, Meyr.

Diptychophora inornata belongs to the *Noctuina*.

The following notes are arranged in systematic sequence :—

EPIPASCHIADÆ.

From a consideration of increased material, I now conclude that several of the genera in this family established by myself and others on neural characters are not tenable; the characters employed, *viz.*, the anastomosing of veins 7 and 8 of the hind wings, and stalking of veins 4 and 5, though valuable in other families, are here found to differ not only in closely allied species, but also sometimes in individuals of the same species. I propose, therefore, to sink *Cacozelia*, Grote, as synonymous with *Stericta*, Ld.; and to include *Catamola*, Meyr., and *Astrapometis*, Meyr., as well as the American *Deuterollyta*, Ld., and *Mochlocera*, Grote, under the head of *Epipaschia*, Clem. As thus defined, *Stericta* will differ from *Epipaschia* essentially only by the penicillate maxillary palpi of the male. *Titanoceros* should have the maxillary palpi absent; but I have only seen the one specimen. The classification of the Australian species will then be as follows :— *Titanoceros cataxantha*, Meyr.; *Epipaschia saburalis*, Walk., *E. classota*, Meyr., *E. capnopis*, Meyr., *E. funerea*, Walk.; *Stericta demotis*, Meyr., *S. tornotis*, Meyr., *S. habitalis*, Gn., *S. thyridalis*, Walk., *S. recurralis*, Walk., *S. cholica*, Meyr., *S. costigeralis*, Walk., *S. xanthomelalis*, Walk., *S. pyrastis*, Meyr.

EPIPASCHIA, *Clem.*

Epipaschia saburalis, Walk.

Also from Albany, West Australia; in December.

Epipaschia funerea, Walk.

Also from Glen Innes (3500 ft.), New South Wales; Melbourne, Victoria; Perth, West Australia; in November and December.

STERICTA, *Ld.*

Stericta (?) demotis, n. s.

♀, 21 mm. Head, palpi, and thorax fuscous, mixed with whitish-ochreous and dark fuscous. Antennæ whitish-ochreous,

annulated with dark fuscous. Abdomen whitish-ochreous, irrorated with dark grey. Legs dark fuscous, ringed with whitish-ochreous. Fore wings elongate-triangular, costa slightly arched, apex obtuse, hind margin obliquely rounded; veins 4 and 5 from a point; fuscous, irrorated with blackish-fuscous, sometimes mixed with whitish-ochreous towards margins; a small blackish-fuscous spot on costa near base, edged laterally with pale; lines cloudy, blackish-fuscous; first from one-fourth of costa to one-third of inner margin, obscurely edged with pale anteriorly, almost straight; second from before two-thirds of costa to two-thirds of inner margin, posteriorly obscurely edged with whitish-ochreous, upper two-thirds strongly but unevenly curved outwards; a small blackish discal spot between these, preceded by some raised ochreous-whitish scales; cilia whitish-ochreous, mixed and obscurely barred with fuscous, with an ill-defined dark fuscous line near base. Hind wings with veins 4 and 5 from a point, 8 free; fuscous-grey, paler towards base and grey-whitish towards costa: an indistinct grey discal lunule at one-third; a curved ill-defined grey-whitish line about three-fourths, anteriorly edged with darker grey; a cloudy dark fuscous hind-marginal line; cilia grey-whitish, with a fuscous-grey line near base.

Geraldton, West Australia; three specimens on flowers after dark, in November. In the case of this and the following species the male is still unknown, and they might therefore possibly be referable to *Epipaschia*; I think this species, however, is almost certainly a true *Stericta*; *S. tornotis* is more doubtful.

Stericta (?) *tornotis*, n. s.

♀, 20 mm. Head, thorax, and abdomen reddish-fuscous, somewhat mixed with whitish-ochreous; face and palpi dark fuscous. Antennæ whitish-ochreous, annulated with fuscous. Legs dark fuscous, ringed with whitish-ochreous. Fore wings elongate-triangular, costa gently arched, apex rounded, hind margin oblique, slightly rounded; veins 4 and 5 stalked; reddish-fuscous, thinly irrorated with dark fuscous and a few whitish-ochreous scales; a transverse dark fuscous tuft of scales in disc before one-third; lines cloudy, whitish-ochreous, edged on discal side with dark fuscous; first from two-fifths of costa to middle of inner margin, somewhat curved outwards near costa; second from three-fifths of costa to three-fourths of inner margin, middle third abruptly curved outwards; a small discal tuft of dark fuscous scales between these: a whitish irroration towards middle of hind

margin; a strong blackish hind-marginal line, interrupted by whitish dots on veins; cilia fuscous-reddish, sharply barred with blackish-grey. Hind wings with veins 4 and 5 stalked, 7 anastomosing strongly with 8; fuscous-grey; cilia grey, with a darker grey line near base.

Helidon, Queensland; one specimen in September.

Stericta habitalis, Gn.

Also from Albany, Geraldton, and Carnarvon, West Australia; in October, November, and April.

Stericta thyridalis, Walk.

Larva 16-legged, cylindrical, posterior extremity tapering; somewhat wrinkled, with a few scattered hairs; greyish-ochreous, slightly pinkish-tinged; spots very small, black; lines blackish-grey, dorsal very fine, subdorsal moderately broad, lateral slender; head blackish-fuscous, suffusedly reticulated with ochreous. Feeds gregariously in tubes of silk and refuse on a shrubby plant (perhaps a *Leucopogon*, but not properly identified) belonging to the *Epacridaceæ*, in September and October.

Also from Albany, West Australia; bred in November and December.

Stericta recurvalis, Walk.

Salma recurvalis, Walk., Cr., 107; *Exacosmia rubiginosa*, ib., Suppl., 609; *Crambus melanospilellus*, ib., Suppl., 1759.

♂ ♀, 28—32 mm. Head and palpi in male wholly blackish-fuscous, in female whitish-ochreous mixed with dark fuscous. Antennæ fuscous, ciliations in male 2, basal process large, reflexed. Thorax crested posteriorly, whitish-ochreous, in male suffused with blackish-fuscous anteriorly, in female greenish-tinged and mixed with dark fuscous. Abdomen whitish-ochreous, irrorated with fuscous. Legs dark fuscous, suffusedly ringed with whitish-ochreous. Fore wings elongate-triangular, costa slightly arched, apex obtuse, hind margin rather obliquely rounded; veins 4 and 5 approximated at base; whitish-ochreous, in female irregularly mixed with light olive-greenish and fuscous-reddish, and unevenly irrorated with blackish-fuscous, in male more or less wholly suffused with fuscous and irrorated with blackish-fuscous, a space on costa between first and second lines and a small spot on middle of hind margin generally remaining pale; a tuft of raised scales in

disc before one-third; a short thick cloudy blackish streak from costa near base: first line blackish, somewhat irregular, nearly straight, from costa near before middle to middle of inner margin, forming a rather conspicuous spot on costa usually preceded by a pale spot; a blackish discal dot, preceded by some raised scales, towards costa close beyond first line: second line blackish, subdentate, from three-fifths of costa to three-fourths of inner margin, forming a small spot on costa, upper two-thirds strongly curved outwards; an interrupted blackish hind-marginal line; cilia grey-whitish, sometimes reddish-tinged, with a grey line near base, and obscurely barred with grey, forming dark grey dots on the line. Hind wings with veins 4 and 5 approximated at base, 7 anastomosing shortly with 8; fuscous, becoming grey-whitish near base; a more or less indistinct curved subdentate pale line about three-fourths; hind-marginal line and cilia as in fore wings.

Melbourne, Victoria; Launceston and Hobart, Tasmania; in January; several specimens. I formerly confused females of this with *Balanotis crypsaula*, and from this latter my former description of *recurvalis* was drawn; it much resembles *Stericta recurvalis*, but the lines are quite differently placed.

Stericta cholica, Meyr.

The female does not differ from the male in marking.

Stericta costigeralis, Walk.

The female is larger than the male, ranging to 29 mm., but not different in marking. Occurs also at Sydney, New South Wales; Fernshaw, Victoria; in October and December.

Stericta xanthomeladis, Walk.

I have not been able to properly examine this species, but it is probably referable here.

Stericta pyrastis, n. s.

♂. 34—35 mm. Head, palpi, antennæ, thorax, abdomen, and legs dark fuscous, mixed with whitish and reddish; antennal process short; thorax beneath with two expansible tufts of long hairs from base of anterior legs. Fore wings very elongate-triangular, costa slightly sinuate, apex rounded, hind margin

rather obliquely rounded; veins 4 and 5 closely approximated at base; ochreous-brown, irregularly irrorated with blackish; base of costa and inner margin suffused with black; first line dark fuscous, from one-third of costa to one-third of inner margin, irregular, on lower half suffusedly margined on both sides with whitish; a small round blackish discal spot; costal space between first and second lines irrorated with white; second line blackish, from two-thirds of costa to two-thirds of inner margin, upper half strongly curved outwards, lower acutely dentate, upper third strongly thickened and preceded by a whitish irroration, lower third also thickened; a blackish suffusion towards hind margin beneath apex; cilia brownish, with two darker lines and obscurely barred with blackish. Hind wings with veins 4 and 5 from a point; bright orange; a broad blackish-fuscous hind-marginal border; cilia whitish, tinged with reddish-fuscous, with a blackish line.

Newcastle, New South Wales; two specimens (Australian Museum). The condition of the palpi did not permit me to make sure whether this species belongs here or to the preceding genus; but I think here.

PYRALIDIDÆ.

BALANOTIS, *Meyr.*

Balanotis carinentalis, Walk.

Also from Townsville and Duaringa, Queensland; Newcastle and Kiama, New South Wales.

Balanotis didymalis, Walk.

The female differs from the male in having the yellow colour of the costa and inner margin of hind wings replaced by white: the specimens described by me are male, and not female, as erroneously stated.

Also from Cape York, Queensland; Newcastle, New South Wales.

Balanotis crypsaula, n. s.

Balanotis recurvalis, Meyr., Trans. Ent. Soc. Lond., 1884, 70 (nec. Walk.).

Two species having been confused, as noted above, I propose this name for the one which I originally, but erroneously, described as *recurvalis*.

The quotation of Tasmania as a locality is incorrect

(or at least premature), and arose from the confusion of species.

Aglossa, *Latr.*

Aglossa pinguinalis, L.

An undoubted female of this species, alleged to have been taken near Melbourne, Victoria (coll. *Lucas*), but I think the locality requires confirmation; if it occurs at all, it will probably be found common: of course an introduced species.

Aglossa cuprealis, Hb.

Also from Newcastle, New South Wales; in December.

Asopia, *Tr.*

Asopia ducalis, Walk.

Pyralis ducalis, Walk., Suppl., 1242; *P. regalis*, ib., 1241.

♀, 19 mm. Head and palpi ochreous-yellow; palpi slender, ascending, terminal joint half second. Antennæ purplish, beneath yellowish. Thorax purple, anterior margin ochreous-yellow. Abdomen purple, apex yellowish. Legs ochreous-yellowish (anterior pair broken). Fore wings elongate-triangular, costa almost straight, apex obtuse, hind margin obliquely rounded: veins 8 and 9 out of 7; purple, sprinkled with dark grey; a moderate ochreous-yellow triangular spot on costa about one-fourth, and a second about two-thirds; lines hardly darker than ground colour, very indistinct, proceeding from costal spots, tolerably straight, first to inner margin at one-fourth, second at three-fourths; a narrow ochreous-yellow hind-marginal fascia, indented by ground colour below middle; cilia ochreous-yellow. Hind wings with colour, hind-marginal fascia, and cilia as in fore wings, but hind-marginal fascia more attenuated irregularly towards middle and abruptly dilated near anal angle.

Queensland; one specimen (coll. *Lucas*); two others in British Museum collection. Walker's first name, *regalis*, must of course be dropped, as he overlooked the European *Asopia regalis*, Schiff. Walker quotes this and various other species received from Mr. Diggles as from Swan River (West Australia); this is almost certainly due to some misunderstanding: all of those with which

I am acquainted I have received from Queensland only, and I have no reason to suppose Mr. Diggles ever collected in West Australia. I do not usually notice Walker's localities, but this error seemed worth marking.

Asopia farinalis, L.

Also from Toowoomba (2000 feet), Queensland; Glen Innes (3500 feet), New South Wales; Melbourne, Victoria; Albany and York, West Australia: from October to April, and in June.

Asopia gerontialis, Walk.

Authenticated from Cooktown, Queensland (coll. *Lucas*).

Asopia caustica, Meyr.

Male and female. Ranges to 20 mm.; quite constant in marking; four specimens.

Vitessa, *Moore*.

Vitessa hemiallactis, n. s.

I propose this name for the New Guinea species previously identified by me (from the description) as *V. pyraliata*, Walk., and described in the Trans. Ent. Soc. Lond., 1886, 213. I have since seen Walker's specimens, and, although very similar to mine, they differ as much as the other species of this genus do from one another. *V. pyraliata* is distinguished from *V. hemiallactis* by having all the white markings very much reduced, and in particular by having the ante-median white band of fore wings replaced by one or two small spots only.

Anemosa, *Walk.*

Forehead with a very long horny narrow flattened projection. Ocelli present. Tongue well-developed. Antennæ in male moderately bipectinated, becoming filiform and ciliated towards apex. Labial palpi very long, straight, porrected, loosely rough-scaled above and beneath, with long expansible hairs above, somewhat attenuated. Maxillary palpi rudimentary. Anterior tibiæ thickened with dense hairs beneath. Fore wings with vein 1 furcate towards base, lower fork running perpendicularly to inner

margin, 2 from three-fourths of cell, transverse vein strongly angulated, 6 out of 9 almost at base, 7 and 8 out of 9, 10 approximated to 9 near base, 11 from before middle of cell, very oblique. Hind wings broader than fore wings; veins 4 and 5 almost from a point, 7 out of 6 near origin, connected with 8 at a point.

A singular genus, apparently somewhat allied to *Drymiarcha* and *Oedematophaga*, especially the former.

Anemosa isadalis, Walk.

Anemosa isadalis (*isadasalis*), Walk., 849.

♂, 24—27 mm. Head, palpi, antennæ, thorax, and legs whitish-ochreous; palpi somewhat mixed with dark fuscous; anterior tibiæ dark fuscous. Abdomen light yellowish. Fore wings elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin obliquely rounded; whitish-ochreous, sometimes faintly reddish-tinged, with a few scattered dark fuscous scales; lines cloudy, fuscous, more or less distinct, becoming blackish on inner margin, first from one-third of costa to two-fifths of inner margin, moderately curved; second from two-thirds of costa to three-fifths of inner margin, middle third forming an abrupt rounded projection outwards; a small round silvery-white blackish-margined spot on second line in middle, and sometimes a smaller one above it; cilia whitish-ochreous, terminal half reddish-fuscous. Hind wings pale ochreous-yellowish; apex and hind-marginal edge suffusedly reddish-tinged; cilia pale yellowish.

Newcastle, New South Wales; two specimens (Australian Museum).

Oedematophaga, *Meyr.*

Oedematophaga ægalis, Walk.

Also from Melbourne, Victoria; I have seen galls probably belonging to this species in Tasmania.

Oenogenes, *Meyr.*

Oenogenes fugalis, Feld.

Also from Deloraine and Launceston, Tasmania; in December.

ENDOTRICHA, *Z.*

Endotricha heliopa, Meyr.

♀, 24 mm. Lines and discal spot as in male, but colouring entirely grey; basal area slightly purplish-tinged, central area faintly ochreous-tinged; cilia with basal half deep crimson, extreme base greyish-ochreous, terminal half white. Both sexes may be recognised by the partially crimson cilia.

Sale, Victoria (coll. *Lucas*).

Endotricha pyrosalis, Gn.

Also from Duaringa, Queensland; Newcastle, New South Wales; Hobart, Tasmania; Perth and Northampton, West Australia: in November and December. Western specimens are somewhat duller and less yellow than Eastern.

Endotricha compsopa, n. s.

♂ ♀, 12—13 mm. Head, palpi, antennæ, thorax, and abdomen reddish-ochreous; palpi mixed with dark fuscous; antennal ciliations of male 3. Legs ochreous-whitish, partly irrorated with dark fuscous. Fore wings very elongate-triangular, costa sinuate, apex obtuse, hind margin rather strongly oblique, slightly rounded; veins 4 and 5 separate; reddish-ochreous, purplish-tinged and irrorated with black, except towards base and costa; first line strong, white, slightly curved outwards, from two-fifths of costa to before middle of inner margin, anterior edge finely margined with black, posterior edge suffused; second line very slender, white, from four-fifths of costa to anal angle, slightly angulated outwards above middle, obscurely blackish-edged; a hind-marginal series of black lunules; cilia white, with a blackish line near base. Hind wings with veins 4 and 5 separate; light ochreous-purplish, finely irrorated with black; first line as in fore wings, running from costa before middle to inner margin before anal angle, closely followed by a narrow waved white line nearly confluent with it; hind-marginal lunules and cilia as in fore wings.

Duaringa, Queensland; several specimens sent by Mr. G. Barnard. Intermediate between *E. heliopa* and *E. puncticostalis*.

Endotricha puncticostalis, Walk.

Also from Rosewood, Queensland, in December.

Endotricha æthopa, Meyr.

Endotricha obscura, Butl., Trans. Ent. Soc. Lond., 1886, 427, is the female of this species.

Endotricha aglaopa, n. s.

♂, 16 mm. Head, palpi, and thorax blackish-fuscous mixed with ochreous; patagia terminating in long whitish hairs. Antennæ pale ochreous annulated with dark fuscous, ciliations 3. Abdomen blackish, somewhat mixed with purplish, anal tuft ochreous-yellowish. Legs whitish-ochreous, anterior and middle coxæ and femora coarsely irrorated with black. Fore wings elongate-triangular, costa sinuate, apex obtuse, hind margin rounded, oblique; veins 4 and 5 separate; very deep fuscous-purple, irrorated with black; lines scarcely paler, almost straight and tolerably parallel, hardly traceable except on costa, where they form conspicuous whitish-ochreous marks, first at one-third, second at three-fourths; between these are three pairs of minute whitish-ochreous dots on costa; cilia with basal half blackish, terminal half crimson-whitish. Hind wings with veins 4 and 5 separate; blackish; a broad clear yellow band before middle, containing some black scales above middle, on costa dilated and extending suffusedly to base; cilia with basal half blackish, terminal half yellow-whitish.

Victoria; one specimen (coll. *Lucas*).

Persicoptera, *Meyr.*.

Persicoptera pulchrinalis, Gn.

Also from Bathurst (2500 feet), New South Wales; Victoria; and Perth, West Australia; in October and November.

Myrmidonistis, n. g.

Forehead vertical, loosely scaled. Ocelli present. Tongue well-developed. Antennæ almost as long as fore wings, in male with joints angularly projecting, moderately ciliated (1), stalk abruptly thickened and deeply notched at base on inner side, forming a sharp projection above notch, basal joint with upper angle sharply projecting below it. Labial palpi very long, straight, porrected, densely rough-scaled above and beneath, terminal joint moderate, loosely scaled. Maxillary palpi rather short, loosely rough-scaled, terminally dilated. Posterior tibiæ in male with outer median and terminal spurs very short, inner median spur

long (inner terminal spur apparently broken). Fore wings with veins 3, 4, 5 closely approximated at base, 7 and 8 out of 9, 10 and 11 very oblique. Hind wings as broad as fore wings; veins 3, 4, 5 closely approximated at base, 7 out of 6 near origin, anastomosing with 8 to near middle.

This is another eccentric genus, in essential structure approaching nearest to *Diplopseustis*, but extremely dissimilar in appearance.

Myrmidonistis hoplora, n. s.

♂, 23 mm. Head white. Palpi greyish-ochreous irrorated with dark fuscous, lower longitudinal half white sprinkled with reddish. Antennæ whitish-ochreous. Thorax whitish-ochreous, collar whitish, shoulders fuscous. Abdomen whitish. Legs white, anterior femora and tibiæ dark fuscous (tarsi broken). Fore wings rather elongate-triangular, costa posteriorly gently arched, apex obtuse, hind margin rather oblique, slightly rounded; greenish-grey, irrorated with white; a narrow white costal streak, margined beneath with fuscous-reddish; lines very obscure, narrow, white, dentate, first from one-fourth of costa to two-fifths of inner margin, second from four-fifths of costa parallel to hind margin to below middle, thence abruptly bent in to below middle of disc, and again rectangularly bent to inner margin beyond middle; a small fuscous dot beneath costa at one-third, and a transverse linear fuscous discal spot in middle; a white hind-marginal streak, terminated by an irregular fuscous-reddish hind-marginal line; cilia whitish, with two greenish-grey lines. Hind wings with hind margin somewhat bent on vein 2; colour, second line, hind-marginal streak and line, and cilia as in fore wings.

Queensland; one specimen (coll. *Lucas*).

Diplopseustis, *Meyr.*

Diplopseustis haplodes, n. s.

♂, 12 mm. Head, antennæ, thorax, and abdomen pale whitish-ochreous, shoulders fuscous. Palpi dark fuscous, labial moderately long, apex of maxillary whitish-ochreous. Legs ochreous-whitish, anterior tibiæ and first joint of tarsi dark fuscous. Fore wings rather elongate-triangular, costa gently arched, apex obtuse, hind margin rather obliquely rounded; veins 4 and 5 separate; whitish-ochreous, with a few pale fuscous scales, especially towards hind margin; costa suffused with fuscous from base to near middle, remainder marked with five small cloudy blackish spots; lines

slender, fuscous, first from one-third of costa to two-fifths of inner margin, slightly curved, second from three-fourths of costa to two-thirds of inner margin, upper half moderately curved outwards; a conspicuous black crescentic discal spot; cilia with basal half whitish-ochreous, terminal half whitish, with a blackish submoniliform parting-line, and a dark grey spot above anal angle. Hind wings with veins 4 and 5 separate; whitish, towards hind margin suffused with pale grey; a grey spot on inner margin representing first line; second line as in fore wings, but interrupted and indistinct; cilia whitish, with a blackish submoniliform median line.

Toowoomba (2000 feet), Queensland; one specimen in December. Relatively broader winged than the other species of the genus, and differing also in having veins 4 and 5 separate in both wings.

Diplopseustis prophetica, n. s.

♂, 14 mm. Head, palpi, antennæ, thorax, abdomen, and legs whitish-ochreous; eyes red; palpi mixed with dark fuscous, labial moderately long; anterior tibiæ suffused with fuscous. Fore wings elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin oblique, hardly rounded, sinuate beneath apex; veins 4 and 5 stalked; pale brownish-ochreous; base of costa suffused with dark fuscous; extreme costal edge blackish on basal third and a small median spot; an elongate-oval transparent spot very near base in middle; first line white, posteriorly suffusedly margined with dark fuscous, from one-third of costa to one-third of inner margin, slightly sinuate; a small white discal spot beyond middle, preceded and followed by a suffused dark fuscous dot; second line white, anteriorly suffusedly margined with dark fuscous, from three-fourths of costa to two-thirds of inner margin, upper half somewhat curved outwards; cilia whitish-ochreous, with a dark grey line (imperfect). Hind wings with veins 4 and 5 short-stalked; pale whitish-ochreous, becoming pale brownish-ochreous towards hind margin; lines, formed as in fore wings, indicated on upper half but very obscurely; cilia ochreous-whitish (imperfect).

Warragul, Victoria; one specimen (coll. *Lucas*).

SICULODIDÆ.

Striglina, *Gn.*

Striglina irias, n. s.

♀, 35 mm. Head and thorax grey, slightly purplish-tinged; face dark grey, forming a conical projection. Palpi dark grey, mixed with ochreous. Antennæ greyish-ochreous. Abdomen pale grey, mixed with ochreous, anal extremity mixed with bright crimson. Legs grey-whitish, somewhat irrorated with darker grey and crimson. Fore wings triangular, costa almost straight, apex round-pointed, hind margin bowed, very oblique; pale ashy-grey, irrorated with pale crimson; costal edge pale crimson; numerous short darker grey transverse strigulæ placed between veins, tending to form transverse series; cilia pale ashy-grey, irrorated with pale crimson. Hind wings with hind margin very slightly rounded; colour, strigulæ, and cilia as in fore wings, but strigulæ in more regular series; a moderate round grey discal spot above middle.

Queensland; one specimen (coll. *Lucas*); a second unnamed in British Museum collection. Nearest to *S. myrtæa*.

Striglina semitesselladis, Walk.

Pyralis semitesselladis, Walk., Suppl., 1246.

I have not obtained the species, and Walker's type is in poor condition, but the following is a diagnosis of it:—

Brownish-grey; posterior two-fifths of both wings whitish reticulated with reddish, with irregular subapical and supra-anal patches of ground colour.

Queensland.

Striglina pyrrhata, Walk.

Arhodia pyrrhata, Walk., Suppl., 1575.

♂ ♀, 26—29 mm. Head, palpi, and thorax ochreous-brown, thorax more obscure posteriorly. Antennæ ochreous. Abdomen light ochreous, suffused with light crimson on basal half. Legs dark fuscous mixed with pale ochreous hairs, anterior pair suffused with crimson, posterior pair whitish-ochreous. Fore wings triangular, costa straight, apex round-pointed, hind margin bowed, oblique; yellow-ochreous, closely and regularly reticulated with deeper ochreous; two or three small dark fuscous spots on posterior half of costa; a purple line from disc at two-thirds to inner margin at three-fifths; cilia ochreous-brown, with a darker line

near base. Hind wings with colour and cilia as in fore wings; a straight purple median transverse line.

Sydney, New South Wales; Warragul, Victoria; in February; two specimens (coll. *Raynor* and *Lucas*).

Siculodes, *H.-S.*

Siculodes magnifica, n. s.

♀, 18 mm. Head and palpi orange mixed with black, face with a conical projection; palpi porrected, roughly scaled. Antennæ black, moderately ciliated (1) (in male probably more strongly ciliated). Thorax black, margins and posterior half of patagia orange. Abdomen black, sides and segmental margins orange. Legs blackish, apex of tarsal joints whitish-ochreous, posterior tibiæ orange. Fore wings rather elongate-triangular, costa somewhat sinuate, abruptly arched before apex, hind margin strongly rounded, oblique; veins 8 and 9 separate; black; three moderate orange fasciæ, not quite touching margins; first subbasal, irregular; second median, narrowed towards extremities; third subterminal, contracted above middle; an orange dot on costa at one-fourth; cilia black. Hind wings black; a broad orange median band, not reaching costa; a small cloudy orange spot beneath costa before apex, and a larger orange spot before middle of hind margin, round which are some scattered orange scales; cilia black.

Bulli, New South Wales; one specimen in October.

Siculodes asuridia, Butl.

Gonocausta asuridia, Butl., Trans. Ent. Soc. Lond., 1886, 429, Pl. X., 5.

Queensland; nearest allied to the preceding species.

Siculodes theorina, n. s.

♂, 58 mm. Head, antennæ, thorax, and abdomen pale ochreous mixed with grey-whitish, partly tinged with brownish or reddish; antennæ shortly bipectinated throughout. Palpi ferruginous, ascending, smooth-scaled, terminal joint very short. Legs pale ochreous, suffused with reddish and mixed with grey. Fore wings elongate-triangular, costa rather strongly sinuate, apex obtuse, hind margin bowed, oblique; vein 1 basally furcate, 8 and 9 separate; reddish-ochreous, costal half suffused with grey-whitish except on an apical patch; five ferruginous fasciæ, darkest on

costa, interrupted beneath it, becoming paler towards inner margin, edged with dark grey; first three narrow, third from two-fifths of costa to before middle of inner margin; fourth moderate, from two-thirds of costa to two-thirds of inner margin, sharply angulated at one-fourth from costa, almost confluent with an irregular discal spot in angle, posterior edge indented towards inner margin; fifth narrow, parallel to fourth, posteriorly merging into irregular reticulations; cilia fuscous. Hind wings with apex obtuse, hind margin rounded; reddish-ochreous, obscurely reticulated with fuscous; four tolerably parallel curved fasciæ indicated by fuscous opposite-waved margins, space between second and third forming four partially hyaline circular spots in disc; cilia fuscous, towards anal angle tips whitish.

Queensland; one specimen (coll. *Macleay*). Phenomenally large as compared with allied forms from neighbouring regions. The pectination of the antennæ is but an exaggeration of the dentation which occurs in some other species.

Siculodes aurata, Butl.

Pharambara aurata, Butl., Ann. Mag. N. H., 1882, 233; *Siculodes hydreutis*, Meyr., Proc. Linn. Soc. N. S. W., 1886, 253).

Since seeing Mr. Butler's type (from New Britain) I have been enabled to make this identification.

Siculodes crypsiria, n. s.

Pharambara reticulata, Butl., Trans. Ent. Soc. Lond., 1886, 420.

I make this change for the reasons stated at the beginning of this paper.

Duaringa, Queensland; sent commonly by Mr. G. Barnard.

Siculodes rhythmica, n. s.

♀, 19 mm. Head and antennæ grey-whitish. Palpi whitish-grey, slender, smooth, ascending, terminal joint moderately long. Thorax white, anterior margin suffused with pale greyish-fuscous. Abdomen whitish. Legs white, banded with dark grey. Fore wings elongate-triangular, costa posteriorly gently arched, apex obtuse, hind margin very obliquely rounded; veins 8 and 9

separate; snow-white; costa suffused with fuscous on basal third; numerous irregularly scattered and partially confluent short transverse fuscous strigulæ between the veins; a round black dot before apex, a second before hind margin in middle, and a third above anal angle; a short black longitudinal mark above second dot; cilia white, barred with light fuscous. Hind wings with colour, strigulæ, and cilia as in fore wings; a round black dot before hind margin beneath apex, and a second before hind margin considerably above anal angle. Fore wings beneath with a double longitudinal streak of black scales, mixed with purple and green metallic scales, along upper margin of cell; markings more ochreous.

Port Darwin, North Australia; two specimens. Nearly allied to *S. anticalis*, Walk.

MESOPEMPTA, *Meyr.*

Mesopempta polyphoralis, Walk.

Pyralis polyphoralis, Walk., Suppl., 1977; *P. polygraphalis*, ib., 1245.

♂ ♀, 15—16 mm. Head and palpi deep ferruginous. Antennæ pale ochreous. Thorax and abdomen reddish-ochreous. Legs reddish-ochreous or fuscous, tarsal joints with pale apical rings, posterior tibiæ in male with an expansible pencil of long fine whitish hairs from base lying in a groove. Fore wings elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin obliquely rounded; pale reddish-ochreous; a darker basal patch extending to one-third of costa and one-fourth of inner margin, its outer edge forming an angular projection above middle; costa between this and fascia strigulated with darker and lighter; a moderate darker fascia, in female more ferruginous-brown, posterior edge straight and sharply defined by a whitish-ochreous line from two-thirds of costa to two-thirds of inner margin, anterior edge dilated inwards on lower half and touching projection of basal patch; a somewhat darker cloud on hind margin beneath apex, and another on anal angle; cilia reddish-ochreous, terminal half whitish-ochreous. Hind wings with hind margin slightly rounded; colour and markings much as in fore wings, but basal patch much smaller and without projection, inner edge of fascia straight and parallel to outer, a tolerably defined streak parallel to fascia at three-fourths, sometimes a small dark reddish-fuscous spot near hind margin beneath apex; cilia as in fore wings.

Duaringa, Queensland; three specimens sent by Mr.

G. Barnard. Walker intentionally substituted the name of *polyphoralis*, having used the name of *Pyralis polygraphalis* twice, in the first instance for a different species.

TINEODIDÆ.

I think the curious additional genus given below discloses so much affinity to the *Siculodidæ* that the family should be transferred to this position. In the diagnosis of the family the neuration of the hind wings should be altered to read: Vein 5 remote from 4, 6 and 7 separate, 8 free or anastomosing at a point with 7.

Epharpastis, n. g.

Forehead vertical. Ocelli present. Tongue well-developed. Antennæ three-fourths, in male slender, strongly bipectinated. Labial palpi long, straight, porrected, second joint rough-scaled above and beneath, terminal joint slender. Maxillary palpi moderate, terminally strongly dilated with rough scales. Posterior tibiæ in male with all spurs nearly equal. Fore wings with vein 1 simple, 3, 4, 5 remote, 8 and 9 stalked. Hind wings as broad as fore wings; 3, 4, 5 remote, 6 and 7 somewhat approximated at base, 8 free, lower median naked.

Epharpastis dædala, n. s.

♂ ♀, 15—16 mm. Head bronzy-ochreous, margins of eyes white. Palpi bronzy-ochreous, beneath white, apex of maxillary palpi white. Antennæ dark fuscous, annulated with white. Thorax bronzy-ochreous, posteriorly mixed with white. Abdomen white, segments coarsely irrorated with black towards base. Legs white, irrorated with black. Fore wings very elongate-triangular, very narrow at base, costa slightly sinuate, apex subfalcate, hind margin concave, rather oblique, rounded beneath; bronzy-ochreous; markings snow-white, partially coarsely margined with black; seven small subquadrate spots on costa, costal edge between them blackish; a small cloudy spot beneath first costal; three irregular fasciæ, tolerably perpendicular to inner margin, first from second costal spot, slender, second from third costal spot, moderate, third from fifth and sixth costal spots, moderate, sometimes dilated towards lower extremity; a fine transverse linear white discal mark between second and third fasciæ: cilia white, with a blackish median line, and barred with blackish except on upper half of hind margin. Hind wings narrow towards base, apex round-pointed,

hind margin subconcave, short; grey, becoming dark grey towards inner margin; margins of three fasciæ indicated by white lines in disc, coalescing to form irregular white spots on inner margin at one-fourth, middle, and three-fourths; a darker grey spot on middle of hind margin; cilia white, with a grey median line, and barred with grey except on upper half of hind margin.

Perth, West Australia; two specimens, in October and November.

MUSOTIMIDÆ.

TRICHOPHYSETIS, *Meyr.*

Trichophysetis cretacea, Butl.

Hydrocampa cretacea, Butl., Ill. Het., iii., 75, pl. lix., 8; *Trichophysetis neophyla*, Meyr., Trans. Ent. Soc. Lond., 1884, 287).

Butler's type is from Japan.

MUSOTIMA, *Meyr.*

Musotima nitidalis, Walk.

Also from Albany, West Australia.

HYDROCAMPIDÆ.

MARGAROSTICHA, *Ld.*

Forehead flat, oblique. Ocelli very small. Tongue well-developed. Antennæ three-fourths, in male filiform, somewhat rough-scaled on back, moderately ciliated ($\frac{1}{2}$). Labial palpi moderate, curved, ascending, second joint roughly haired beneath, terminal joint moderate, cylindrical, obtuse. Maxillary palpi moderate, terminally loosely dilated with scales. Middle tibiæ of male sometimes with a pencil of hairs lying in a groove; posterior tibiæ with outer spurs half inner. Fore wings with veins 4 and 5 stalked, 10 out of stalk of 8 and 9, 11 absent. Hind wings as broad as fore wings; veins 4 and 5 approximated at base, 6 anastomosing with 8 at a point near origin, 7 absent (coincident with 8).

Margarosticha sphenotis, n. s.

♂ ♀, 19—22 mm. Head and palpi pale ochreous mixed with white. Antennæ whitish-ochreous. Thorax white, somewhat mixed with ochreous. Abdomen yellow-ochreous, apex blackish. Legs white, anterior pair ochreous-whitish, apex of joints grey; middle tibiæ in male with a tuft of long hairs in groove. Fore

wings very elongate-triangular, costa posteriorly arched, apex rectangular, hind margin obliquely rounded, somewhat sinuate beneath apex; deep ochreous-yellow, in female paler; markings snow-white, obscurely margined with dark grey, an elongate-triangular spot on base of inner margin parallel to costa, reaching disc at one-third; a moderately broad rather outwardly oblique fascia-like spot from inner margin at two-fifths, reaching half across wing, its apex produced into two long teeth posteriorly; a leaden-metallic elongate mark on anal angle; a moderate outwardly oblique fascia from two-thirds of costa, reaching two-thirds across wing, and a narrower fascia from costa near before and parallel to hind margin, both attenuated and almost or quite meeting at lower extremity; an interrupted black hind-marginal line; cilia shining whitish-grey. Hind wings snow-white; a dark grey irregular fascia at one-third, anteriorly suffused; an irregular ochreous-yellow grey-margined fascia from middle of costa to anal angle, dilated beneath, followed by an iridescent pale grey narrow fascia with an acute tooth beneath; space between this fascia and marginal spots closely speckled with black; five roundish black marginal spots on upper portion of hind margin, first and fifth smaller, all surrounded with clear white and connected by yellow dots; apex narrowly ochreous-yellow; cilia shining whitish-grey, with a dark grey basal line.

Cairns, Queensland; three specimens (coll. *Macleay* and *Lucas*).

Cataclysta, *Hb.*

Cataclysta lampetialis, Walk.

Cataclysta lampetialis, Walk., 451.

♀, 17 mm. Head, palpi, and thorax ochreous-yellowish mixed with white. Antennæ whitish-ochreous. Abdomen yellowish, segmental margins whitish. Legs whitish, anterior pair with apex of joints dark grey. Fore wings very elongate-triangular, costa almost straight, apex rounded, hind margin obliquely rounded; ochreous-yellow, from base to two-thirds irregularly irrorated with black; a straight narrow leaden-metallic partially blackish-margined fascia from beneath costa at three-fifths to before anal angle; a transverse white laterally black-margined spot in disc at three-fourths, nearly reaching costa, narrowed beneath; a narrow leaden-metallic blackish-margined fascia near and parallel to hind margin, becoming white above, not reaching costa, beneath attenuated and bent down to anal angle; an interrupted black hind-marginal line; cilia whitish-grey, with a darker grey line. Hind wings with all

veins present; ochreous-yellow, towards base irregularly irrorated with black; markings whitish densely irrorated with blackish, appearing grey, blackish-margined; an irregular median band, becoming very broad towards costa, where it includes an irregular spot of ground colour; a narrow irregular fascia between this and hind margin; four rounded-quadrate black spots on hind margin towards middle, lowest rather smaller; cilia grey-whitish, with a grey line.

Queensland; one specimen (coll. *Lucas*).

Paraponyx, *Hb.*

Paraponyx eromenalis, Snell.

Cænostola eromenalis, Snell., Tijd. v. Ent., 1880, 226; ib., 1883, pl. iii., 4.

♂. 16 mm. Head white, crown centrally yellowish. Palpi white, upper half of second joint fuscous, second joint roughly tufted beneath. Antennæ whitish-ochreous. Thorax whitish, mixed with ochreous, and spotted with dark fuscous. Abdomen whitish-ochreous (partly defaced), with a clear white subbasal ring. Legs white, anterior tibiæ ochreous, with apical half dark fuscous. Fore wings elongate-triangular, costa almost straight, apex tolerably obtuse, hind margin obliquely rounded, somewhat sinuate beneath apex; brownish-ochreous, mixed with whitish towards disc; costal edge whitish, with six somewhat wedge-shaped small dark fuscous spots; first and second connected with base by two fine blackish lines parallel to costa, separated by an ochreous-yellow streak continued to apex of wing; beneath this is a silvery-white black-margined streak from near base to five-sixths, interrupted by first and second lines and by a yellow bar in middle; an irregular white anteriorly blackish-margined streak from near base of inner margin to meet longitudinal white streak before first line; first and second lines white, more or less ochreous-tinged, margined with dark fuscous; first from second costal spot to two-fifths of inner margin, unevenly curved; second starting from longitudinal white streak beyond central bar, below middle acutely bent inwards to below yellow bar, which it surrounds with two projections, thence again acutely outwards to near inner margin, and again acutely inwards to middle of inner margins; veins near costa posteriorly lined with black; a snow-white black-margined streak in disc from second to submarginal lines; submarginal narrow, snow-white, black-margined, parallel to hind margin, not quite reaching costa attenuated in middle,

leaving an ochreous-yellow hind-marginal fascia; a row of elongate blackish dots on hind margin; cilia grey-whitish, somewhat mixed with grey, with a grey apical spot, and a blackish line near base. Hind wings white; first line at one-third, ochreous-whitish, margined with black, anteriorly broadly, straight, somewhat waved; a short ochreous-yellow transverse discal streak, resting on middle of second line; second line irregular, mixed with ochreous, strongly margined with blackish, from two-thirds of costa to inner margin near anal angle, upper half curved outwards; an irregular curved blackish line from costa near beyond second line, running into second line near lower extremity, included space ochreous-brown; a narrow ochreous hind-marginal fascia, margined anteriorly with blackish, touching preceding line above middle; three white dots on middle of hind margin, followed by quadrate black spots in cilia; cilia as in fore wings, with a second grey line towards middle.

Queensland; one specimen (coll. *Lucas*). If really Snellen's species, also from Celebes and Java. I believe that it is so; but Snellen unaccountably refers it to *Cœnostola*, whereas it is an undoubted *Paraponyx*; his description is insufficient for the unusually complex markings of this species, and his figure is also very poor; I have therefore redescribed the species to avoid misapprehension.

Paraponyx polydectalis, Walk.

Also from Newcastle, New South Wales.

Paraponyx responsalis, Walk.

Diasemia responsalis, Walk., Suppl., 1326.

♂, 14—16 mm. Head, palpi, antennæ, thorax, and abdomen pale ochreous, sometimes mixed with darker ochreous or fuscous; palpi with second joint shortly rough-scaled beneath, terminal joint about half second, rather thick, filiform, obtuse. Legs ochreous-whitish. Fore wings very elongate-triangular, costa almost straight, apex rounded, hind margin obliquely rounded; ochreous, somewhat irrorated with fuscous; extreme base fuscous; an irregular whitish transverse line at one-fifth, anteriorly margined with a fuscous line; first and second lines rather irregular, white, margined with fuscous, first from two-fifths of costa to before middle of inner margin, slightly bent outwards beneath costa, second from four-fifths of costa to two-thirds of inner margin,

below middle with a short rather abrupt curve inwards; included median space suffused with fuscous, containing small white orbicular and reniform spots, and a white cloudy spot on middle of costa; a series of irregular white spots before hind margin, surrounded by a more or less dark fuscous suffusion; cilia grey-whitish, with a darker grey median line (imperfect). Hind wings with colour, submarginal spots, and cilia as in fore wings; first and second lines white, dark-margined, tolerably regular and slightly curved, converging almost to a point on inner margin beyond middle, included median space fuscous.

Duaringa, Queensland; two specimens sent by Mr. G. Barnard.

Paraponyx dicentra, Meyr.

Oligostigma pallida, Butl., Trans. Ent. Soc. Lond., 1886, 423, is a synonym of this.

Hydreuretis, *Meyr.*

Hydreuretis tullialis, Walk.

Also from Newcastle, New South Wales.

Schœnobius, *Dup.*

Schœnobius imparellus, Meyr.

Also from Melbourne, Victoria. The water-plant on which the larva of this species feeds has been identified for me as *Heleocharis sphacellata*.

BOTYDIDÆ.

Margarodes, *Gn.*

Margarodes limbata, Butl.

Margarodes limbata, Butl., Trans. Ent. Soc. Lond., 1886, 430.

Apparently a good species.

Margarodes unionalis, Hb.

Newcastle, New South Wales; one specimen (Australian Museum). Also from South Africa, South Europe, and Asia.

Margarodes diaphanalis, Walk.

Margaronia diaphanalis, Walk., Suppl., 1365; *Botys margaronialis*, ib., 1442.

♀, 29 mm. Head, palpi, antennæ, thorax, and abdomen shining white; lower part of face greyish; palpi towards apex dark purplish-grey; shoulders narrowly fuscous-grey. Legs blackish ringed with white, posterior pair white. Fore wings very elongate-triangular, costa posteriorly gently arched, apex obtuse, hind margin slightly rounded, very oblique; iridescent white; a narrow dark fuscous costal streak from base to apex, posteriorly attenuated; a black transverse discal dot; a submarginal series of conspicuous black dots; cilia shining white. Hind wings and cilia iridescent white; sometimes hind-marginal dots as in fore wings.

Cairns, Queensland; one specimen (coll. *Macleay*). I have compared Walker's specimens of *margaronialis*; but his *diaphanalis*, which is not in the British Museum collection, I have identified from description; however, I believe there is little doubt about it. The former is from Java, the latter from Aru. I think it not improbable that *M. plumifera*, Butl. (Ann. Mag. N. H., 1882, 236), from New Britain, may be the male of this species.

Margarodes tritonias, n. s.

♂, 45—49 mm. Head, antennæ, thorax, abdomen, and legs iridescent greenish-whitish; lower angles of face and margins of shoulders bright yellow-ochreous; antennal ciliations one-third; anal tuft blackish; anterior and middle tibiæ suffused with ochreous, middle tibiæ shortly rough-scaled above. Palpi bright yellow-ochreous, lower half of labial white. Fore wings elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin almost straight, oblique; iridescent greenish-whitish; a moderate pale ochreous costal streak, becoming obsolete towards apex, costal edge purplish-tinged; a blackish discal dot; a hind-marginal series of minute black elongate dots; cilia white. Hind wings iridescent greenish-whitish; a very fine blackish hind-marginal line, tending to be interrupted; cilia white.

Cooktown, Queensland; two specimens (coll. *Macleay*).

Margarodes vertumnalis, Gn.

Also from Newcastle, New South Wales.

Pachyarches, *Ld.*

Pachyarches psittacalis, Hb.

Margaronia maliferalis, Walk., Suppl., 1363, is a synonym of this. Also from Townsville, Queensland.

Glyphodes, *Gn.*

Glyphodes tyres, Cr.

Pyralis tyres, Cr., 263 C; *Pygospila tyresalis*, Gn., 312.

Port Darwin, North Australia; several specimens (coll. *Macleay*). Also from India and Ceylon. Lederer follows Guénée in maintaining a separate genus, *Pygospila*, for this species; but he does not give any sufficient point of distinction from *Glyphodes*, only alleging differences in the anal tuft which I find inappreciable; I have therefore suppressed it.

Glyphodes conjunctalis, Walk.

Glyphodes conjunctalis, Walk., Suppl., 1357; *G. actorionalis*, Ld., pl. xiv., 4 (nec Walk.); *G. Ledereri*, Butl., Ann. Mag. N. H., 1884, 203).

♂ ♀, 25—28 mm. Head and antennæ dark fuscous, with a white line above eyes. Palpi black, apex white. Thorax blackish, with a quadrate white spot on each side. Abdomen fuscous, towards base and apex blackish, beneath white, with black rings. Legs dark fuscous, posterior pair white, outer spurs half inner. Fore wings elongate-triangular, costa posteriorly arched, apex obtuse, hind margin obliquely rounded; blackish, with violet-white somewhat transparent markings; a small spot in disc before one-fourth, and a larger roundish one beyond it; an irregular elongate spot along inner margin from near base to middle; a large suboval transverse blotch in disc beyond middle, not reaching margins; a small transverse spot on costa at four-fifths, beneath which is a round dot; a straight transverse series of four subtriangular dots on lower half of wing near hind margin, lowest marginal; from one to three dots before hind margin below middle; cilia blackish, beneath apex and above anal angle white. Hind wings blackish, with violet-white subtransparent markings; a very broad band extending from very near base to beyond middle, outer edge curved, waved; two dots transversely placed near beyond this towards costa; a moderate subquadrate spot on hind margin above

middle; two small triangular spots very near hind margin above anal angle; cilia blackish, near above anal angle and sometimes shortly beneath apex white with a black basal line.

Cairns, Queensland; four specimens (coll. *Macleay* and *Lucas*). Also from New Guinea and Mysol.

Glyphodes Doleschali, Ld.

Glyphodes Doleschali, Ld., 478, pl. xiv., 1.

Cooktown, Queensland; one specimen (coll. *Macleay*). Also from Amboina.

Glyphodes perspicillalis, Z.

Also from Cooktown and Cairns, Queensland.

Glyphodes tolumnialis, Walk.

Duaringa and Cooktown, Queensland; Newcastle, New South Wales.

I notice that Mr. Moore, in his Lepidoptera of Ceylon, asserts that the Australian *G. tolumnialis* is quite distinct from his *sexpunctalis* (= *lomaspilalis*, Snell. = *nympha*, Butl.); as I had previously asserted their identity, and he gives no points of distinction, I should have been justified in neglecting this statement; I have, however, again examined the evidence, as well as in some other cases mentioned hereafter. I compared Butler's types of *nympha*, which Mr. Moore himself regards as identical with his *sexpunctalis*, with Walker's types of *tolumnialis*, standing in the same drawer of the British Museum collection, and am unable to detect even a shadow of difference between them; and Mr. Moore's description applies equally to both. Until, therefore, he shall have indicated his grounds, I think the distinction may be considered of as little value as the characters of the new genus which he institutes to contain this species.

Glyphodes excelsalis, Walk.

Also from Duaringa and Cooktown, Queensland. *Glyphodes Westermanni*, Snell., Tijd. v. Ent., 1877, 73, pl. v., 8, is a synonym of this; from Celebes.

Glyphodes ityalis, Walk.

Glyphodes ityalis (*itysalis*), Walk., 501; *G. piepersialis*, Snell., Midd. Sum., 68, Tijd. v. Ent., 1883, pl. viii., 11; *G. malayana*, Butl., Proc. Zool. Soc., 1880, 684.

The species varies somewhat in the discal mark of the hind wings, which tends to become obsolete. I have it also from Ceylon.

Glyphodes biritralis, Gn.

Glyphodes biritralis, Gn., 293.

Queensland; one specimen (coll. *Lucas*). Also from India. Antennal ciliations of male one; posterior tibiæ with outer spurs one-fourth of inner.

Glyphodes cosmarcha, n. s.

♀, 46 mm. Head and antennæ whitish-ochreous, with a white line above eyes. Palpi with a cloudy dark fuscous lateral line, above it light ochreous, beneath white. Thorax pale ochreous, with obscure whitish lines (partly defaced). Abdomen pale ochreous mixed with whitish, apex whitish. Legs ochreous-whitish, posterior tibiæ with outer spurs one-third of inner. Fore wings elongate-triangular, costa slightly sinuate, posteriorly arched, apex obtuse, hind margin oblique, somewhat bowed; pale greyish-ochreous; markings violet-whitish, semitransparent, margined with dark fuscous; a narrow basal fascia; a slender fascia from costa near base to one-third of inner margin, preceded and followed by faint parallel fuscous lines; a broad fascia from one-third of costa to middle of inner margin, constricted beneath; a narrow irregular transverse streak near beyond this, not reaching either margin; a subquadrate blotch on costa at three-fifths, reaching nearly half across wing, connected with inner margin by a dark fuscous cloudy suffusion; a line from three-fourths of costa to three-fourths of inner margin, forming a small spot on costa, sinuate beneath it, on lower half forming four small connected triangular spots; a cloudy fuscous spot near hind margin above middle; a dark fuscous hind-marginal line; cilia ochreous-whitish, with a cloudy fuscous line. Hind wings violet-whitish, semi-transparent; a short oblique yellow-ochreous streak on transverse vein, margined with dark fuscous; a very small yellow-ochreous dark-margined oval spot below middle of disc; a narrow yellow-ochreous fascia, margined with dark fuscous, from a dark fuscous

blotch on costa at two-thirds to hind margin near anal angle, where it is bent inwards; an obscure cloudy dark fuscous line near beyond this; a small dark fuscous apical spot; two small roundish dark fuscous spots near hind margin beneath apex; a dark fuscous hind-marginal line; cilia white, with an obscure grey line.

Queensland; one specimen (coll. *Lucas*).

Morocosma, *Ld.*

Morocosma margaritaria, Cr.

Pyralis margaritaria, Cr., 367 C; *Glyphodes crameralis*, Gn., 293; *Morocosma margaritaria*, Ld., pl. xiv., 7; *M. polybapta*, Butl., Ann. Mag. N. H., 1882, 236.

Cairns, Queensland; one specimen (coll. *Macleay*). Also from Amboina and Duke-of-York Island.

Euclasta, *Ld.*

Euclasta maceratalis, Ld.

Townsville and Rockhampton, Queensland.

Synclera, *Ld.*

I have not satisfactory material to make out a full description of the generic characters, but they appear to be in the main identical with those of *Glyphodes*, from which this genus is distinguished by having the antennæ nearly as long as the fore wings, and the maxillary palpi filiform.

Synclera braurealis, Walk.

Zebrouia braurealis, Walk., 971; *Lepyrodes astomalis*, Feld., pl. cxxxv., 22; *Glyphodes astomalis*, Meyr., Trans. Ent. Soc. Lond., 1886, 224.

Occurs also in Ceylon and Borneo.

Although I have not been able to re-examine the characters of this species, I expect it is referable here; in the single specimen which I previously examined the antennæ were imperfect, and I probably overlooked the filiform character of the maxillary palpi.

Synclera onychinalis, Gn.

Asopia onychinalis, Gn., 205, pl. vi., 9.

Cooktown, Queensland; one specimen (coll. *Macleay*). Also from Celebes and India.

Phalangiodes, *Gn.*

Phalangiodes neptis, Cr.

Also from Duaringa, Queensland.

Phalangiodes columalis, Snell.

Phalangiodes columalis, Snell., Tijd. v. Ent., 1880, 239; ib., 1883, pl. iv., 8.

New Guinea; several specimens (coll. *Macleay*). Also from Celebes.

Rhimphalea, *Ld.*

Rhimphalea lindalis, Walk.

Botys lindalis (*lindusalis*), Walk., 712; *Rhimphalea sceletalis*, Ld., 411, pl. xv., 3; *R. œnone*, Butl., Trans. Ent. Soc. Lond., 1886, 428.

Occurs also in Borneo.

Lonchodes, *Gn.*

Lonchodes argillacea, Butl.

Tatobotys argillacea, Butl., Proc. Zool. Soc., 1880, 686; *Lonchodes ceramochra*, Meyr., Trans. Ent. Soc. Lond., 1885, 443.

Butler's specimens were from Formosa.

Spanista, *Ld.*

Spanista ornatalis, Dup.

Cataclysta elutalis, Walk., 448; *Pyralis deciusalis*, ib., 905; and *Cataclysta fraterna*, Butl., Ann. Mag. N. H., 1875, 415, are additional synonyms of this species.

Filodes, *Gn.*

Forehead rounded, oblique. Ocelli present. Tongue well-developed. Antennæ considerably longer than fore wings, in male serrate, shortly ciliated ($\frac{2}{3}$). Labial palpi moderate, arched,

ascending, second joint with dense projecting scales beneath, terminal joint very short, cylindrical, obtuse. Maxillary palpi moderate, terminally dilated with loose scales. Abdomen in male elongate, anal tuft moderately large. Posterior tibiæ with outer middle-spur absent in both sexes; anterior femora and basal half of tarsi in male clothed with dense hair beneath. Fore wings with vein 10 approximated to 9, 11 very oblique. Hind wings as broad as fore wings; veins 3, 4, 5 approximated at base, 7 out of 6 near origin, anastomosing with 8 to beyond one-third (in the only male examined coincident with 8 to apex, but possibly an abnormal instance).

Filodes fulvidorsalis, Hb.

Pinacia fulvidorsalis, Hb., Zut., 643, 644; *Filodes fulvidorsalis*, Gn., 317; Ld., pl. xii., 17.

Cooktown, Queensland; one specimen (coll. *Macleay*). Also from Manilla, Java, and Ceylon.

Dracœnura, *Meyr.*

Dracœnura pelochra, Meyr.

Botys argyrogaster, Butl., Trans. Ent. Soc. Lond., 1886, 431, is a synonym of this.

Pleonectusa, *Ld.*

Pleonectusa adhæsalis, Walk.

Botys adhæsalis, Walk., 664; *B. atopalis*, ib., 664; *B. damasalis*, ib., 668; *B. macaralis*, ib., 709).

♀, 20—22 mm. Head and thorax light fuscous, tinged with whitish-ochreous. Palpi dark fuscous, towards base white beneath. Antennæ pale greyish-ochreous, annulated with fuscous. Abdomen whitish-ochreous. Legs ochreous-whitish. Fore wings very elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin oblique, somewhat bowed; fuscous, somewhat tinged with whitish-ochreous; a dark fuscous dot beneath costa at one-fourth, and a small dark fuscous transverse discal spot in middle; second line slender, dark fuscous, slightly waved, from two-thirds of costa to three-fourths of inner margin, gently curved outwards; a fine dark fuscous hind-marginal line; cilia whitish, with a strong dark grey line near base. Hind wings with colour, discal spot, second and hind-marginal lines, and cilia as in fore wings; but discal spot at one-third, smaller and less distinct, second line somewhat irregular but hardly curved.

Queensland; two specimens (coll. *Lucas*). Also from Borneo, China, Ceylon, and Mauritius.

Pleonectusa parallela, Meyr.

Botys horatius, Butl., Trans. Ent. Soc. Lond., 1886, 430, is a synonym of this.

Pleonectusa modestalis, Ld.

Erilita modestalis, Ld., 426, pl. xvi., 3; *Pleonectusa chalinota*, Meyr., Trans. Ent. Soc. Lond., 1886, 233.

Lederer founded the genus *Erilita* on this species, distinguishing it by a supposed peculiarity in the origin of vein 5 of the fore wings, which I am unable to perceive. I therefore think the genus may be rightly suppressed. It was in consequence of this supposed distinction that I failed at first to identify his species.

Cnaphalocrocis, *Ld.*

Cnaphalocrocis medinalis, Gn.

Salbia medinalis, Gn., 201; *Botys rutilalis*, Walk., 665; *B. iolcalis*, ib., 666; *B. nurscialis*, ib., 724; *B. acerrimalis*, ib., Suppl., 1449; *Cnaphalocrocis iolinalis*, Ld., pl. xii., 7.

Mr. Moore has identified Guénée's description of *Salbia medinalis* with this species; and, although this presupposes some inaccuracy in the description, Guénée described a single female only, perhaps not in good condition, and I am disposed to regard the identification as probably correct. Mr. Moore also alleges that Walker's *nurscialis* is a distinct species, without giving reasons; in this case there is some colour for the supposition, as in the Australian insect there is a more or less yellowish hind-marginal streak which seems obsolete elsewhere, but the point is variable, and without further evidence I prefer to regard it as a local form only. I have not, however, examined the neuration of the extra-Australian form.

MARASMIA, *Ld.*

Marasmia hemicrossa, n. s.

♂ ♀. 16—17 mm. Head fuscous, margins of face slenderly white. Palpi dark fuscous, beneath white towards base. Antennæ pale greyish-ochreous. Thorax fuscous, becoming white posteriorly. Abdomen whitish, base and lateral hairs of anal segment in male fuscous. Legs white, anterior tibiæ fuscous. Fore wings elongate-triangular, costa slightly sinuate, apex obtuse, hind margin obliquely rounded; whitish; a broad fuscous costal border, containing a small dark fuscous discal spot in middle, and an equally broad fuscous hind-marginal band, its anterior edge triangularly indented above anal angle, and indicated on costal band by a pale obscure line; cilia fuscous (imperfect). Hind wings white, thinly scaled; a transverse linear dark fuscous discal spot at one-third; a short oblique cloudy dark fuscous streak from anal angle: in male a broad very pale whitish-ochreous apical suffusion, becoming fuscous at extreme apex; in female a large quadrate fuscous apical spot; cilia white.

Tahiti: two specimens received from Mr. J. J. Walker, R.N.

DOLICHOSTICHA, *Meyr.*

Dolichosticha trapezalis, Gn.

Salbia trapezalis, Gn., 200; *Botys creonalis*, Walk., 579; *B. neoclesalis*, ib., 635; *B. suspicalis*, ib., 667; *B. convectalis*, ib., Suppl., 1411; *Cnaphalocrocis bifurcalis*, Snell., Tijd. v. Ent., 1880, 219; ib., 1883, pl. viii., 5.

I have no doubt of this identification; the species varies somewhat, but I have specimens agreeing perfectly with Guénée's description. A Tahitian form, sent by Mr. J J. Walker, is unusually dark and large, but not distinct.

West Indies, Tahiti, Marquesas and Ellice Islands, Fiji, Celebes, Java, Ceylon, India, West and South Africa.

Dolichosticha venilialis, Walk.

Also from Tahiti; sent by Mr. J. J. Walker.

Dolichosticha perinephes, Meyr.

Duaringa, Queensland; one female sent by Mr. G.

Barnard, more ochreous-yellowish than the Fijian male, but not otherwise different.

Syngamia, *Gn.*

Syngamia floridalis, Z.

Also from Cairns, Queensland (coll. *Macleay* and *Lucas*); Tahiti (*Mr. J. J. Walker*).

Hyalea fulvidalis, Wallgr., Wien. Ent. Mon., 1860, 174, is, I feel satisfied, an additional synonym of this species.

Agathodes, *Gn.*

Forehead flat, oblique. Ocelli present. Tongue well-developed. Antennæ four-fifths, in male shortly ciliated (¼), filiform. Labial palpi moderate, arched, ascending, second joint with long dense projecting scales beneath, terminal joint concealed. Maxillary palpi rather short, terminally dilated with scales. Abdomen in male with anal segment elongate, tuft short, slender, valves retracted. Posterior tibiæ with outer middle-spur one-fourth, outer end-spur one-third of inner. Fore wings with vein 10 approximated to 9, 11 very oblique. Hind wings one-third broader than fore wings; veins 3, 4, 5 closely approximated at base, 7 out of 6 near origin, anastomosing with 8 to one-third.

Agathodes ostensalis, Hb.

Perinephela ostensalis, Hb., Zut., 833, 834; *Agathodes ostensalis*, Gn., 208.

Cooktown, Queensland; one specimen (coll. *Macleay*). Also from Celebes, Sumatra, Java, and India.

Diathrausta, *Ld.*

Forehead tolerably flat, oblique. Ocelli present. Tongue well-developed. Antennæ almost as long as fore wings (in male filiform, shortly ciliated, according to Lederer). Labial palpi moderate, obliquely ascending, second joint with short rough projecting scales beneath, terminal joint moderately long, cylindrical. Maxillary palpi moderate, dilated with scales towards apex. Fore wings with vein 10 rising out of stalk of 8 and 9, 11 oblique. Hind wings as broad as fore wings; veins 3 and 4 from a point, 5 absent, 7 out of 6 near origin, anastomosing with 8 to near middle.

Diathrausta profundalis, Ld.

Diathrausta profundalis, Ld., 146, pl. xvii., 7.

♀, 15 mm. Head dark fuscous, sides of face and central line of crown whitish. Palpi dark fuscous, towards base and on terminal joint white. Antennæ and thorax dark fuscous. Abdomen dark fuscous, segmental margins more or less white. (Legs broken.) Fore wings elongate-triangular, costa posteriorly gently arched, apex rectangular, hind margin oblique, bowed, sinuate beneath apex; blackish-fuscous; second line darker, obscure, from costa at three-fifths, preceded by a clear white oblong transverse spot reaching half across wing, beneath which it is bent abruptly inwards to middle of disc, thence again rectangularly bent to inner margin beyond middle, near inner margin preceded and followed by a small cloudy white spot; a cloudy white dot on costa beyond second line, and a small clear white spot on costa before apex; cilia white, with dark fuscous apical, median, and anal spots. Hind wings with colour and markings as in fore wings, but second line margined on both sides with white throughout; cilia with an additional small dark fuscous spot near anal angle.

Queensland; one specimen (coll. *Lucas*). Also from Amboina, Celebes, and Java. As Lederer scarcely describes the species, I have redescribed it.

Diasemia, *Gn.*

Diasemia ramburialis, Dup.

Lineodes leodocusalis, Walk., 947, from North America, is an additional synonym of this.

Also from Brisbane, Queensland; Murrurundi and Sydney, New South Wales; from September to December.

Diasemia grammalis, Dbld.

Isopteryx impulsalis, Walk., 404, from Ceylon, is an additional synonym of this.

Ischnurges, *Ld.*

The characters of this genus are given by me under the head of *Nesolocha*; those given by Lederer are partly erroneous, and led to my renaming it.

Ischnurges illustralis, Ld.

Ischnurges illustralis, Ld., 418, pl. xv., 12; *Nesolocha autolitha*, Meyr., Trans. Ent. Soc. Lond., 1886, 240.

Newcastle, New South Wales; one specimen (Australian Museum). I think there can be no doubt that Lederer's quotation of New Zealand as a locality for this species is quite erroneous, and should be struck out; probably there is here, as in some other cases, a confusion with New Guinea.

Pessocosma, *Meyr.*

Pessocosma iolealis, Walk.

Also from Toowoomba, Queensland; Albany and Geraldton, West Australia: in May, June, November, and December.

Archernis, *Meyr.*

Archernis (?) *octoguttalis*, Feld.

Also from Cape York, Queensland; one specimen (coll. *Macleay*). In this specimen (also a female) the middle costal spot is divided into a moderate costal and small discal spot; the yellow hind-marginal band is narrower. Recorded also from Ceylon. I consider that *Pyralis smaragdina*, Butl., Ann. Mag. N. H., 1875, 411, from South Africa, is a synonym of this species; Felder's name dates from the same year, but is apparently the earlier.

Semioceros, *Meyr.*

Semioceros mesochlora, Meyr.

Deuterarcha mesochlora, Meyr., Trans. Ent. Soc. Lond., 1884, 313; *Endotricha annuligera*, Butl., Trans. Ent. Soc. Lond., 1886, 427.

In the male which I originally described the antennal tuft was abraded, and therefore unnoticed; since then Mr. Barnard has sent down numerous specimens which enable me to correct my error. The antennæ of the male are bent once only, in the middle, with a small simple tuft of scales on back immediately before bend.

Semioceros parapsephis, n. s.

♂ ♀, 12—14 mm. Head and thorax whitish-ochreous, with a few fuscous scales. Palpi white, terminal joint and apex of second dark fuscous. Antennæ pale greyish-ochreous, in male shortly ciliated (⅓), bent before middle, tuft small, fuscous. Abdomen light ochreous irrorated with fuscous, segmental margins white. Legs pale greyish-ochreous, apex of joints white. Fore wings elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin rather strongly oblique, somewhat bowed; whitish-ochreous, suffusedly irrorated with rather dark fuscous, except generally towards costa and inner margin; an obscure whitish subbasal spot on inner margin; first line blackish-fuscous, rather irregular, from one-fifth of costa to one-third of inner margin, forming a small spot on inner margin, and preceded on lower half by a white suffusion; orbicular and claviform apparently subquadrate and confluent, indicated only by cloudy dark fuscous lateral margins; reniform similar; a white dot connecting orbicular with first line; a narrow transverse white spot connecting orbicular and reniform, and a larger quadrate white spot immediately below this touching second line; a white subquadrate spot connecting reniform with second line; second line blackish-fuscous, rather irregular, from three-fourths of costa to near anal angle, thence abruptly bent inwards to beneath reniform, and again abruptly bent to inner margin at two-thirds, posteriorly narrowly and suffusedly margined with white, forming a white spot touching hind margin above anal angle; a blackish-fuscous hind-marginal line; cilia whitish, with a submoniliform dark fuscous line tending to form bars, terminal half light grey, with a white bar above anal angle. Hind wings with colour, discal (reniform) spot, and all posterior markings as in fore wings.

Duaringa, Queensland; six specimens sent by Mr. G. Barnard. Nearly allied to *S. murcalis*, but much smaller and more neatly marked; best distinguished by the presence of the quadrate white spot below middle of disc of fore wings.

CERATOCLASIS, *Ld.*

Forehead rounded, vertical. Ocelli present. Tongue well-developed. Antennæ three-fourths, in male strongly ciliated (1½), bent in middle, bend thickened, rough-scaled above, and with some larger roughly tufted scales beneath. Labial palpi moderate, curved, ascending, second joint with short rough projecting scales

beneath, terminal joint moderate, cylindrical. Maxillary palpi very short, rudimentary. Abdomen in male with moderate anal tuft, valves retracted. Anterior tarsi in male thickened with dense scales curved over beneath; posterior tibiæ with outer spurs half inner. Fore wings with vein 10 approximated to 9, 11 oblique. Hind wings as broad as fore wings; veins 3, 4, 5 closely approximated at base, 7 out of 6 near origin, anastomosing with 8 to near middle.

Ceratoclasis chlorura, n. s.

♂, 20 mm. Head dark fuscous, with an ochreous-whitish spot between antennæ. Palpi dark fuscous, base ochreous-whitish. Antennæ and thorax dark fuscous. Abdomen dark fuscous, apical tuft and under surface ochreous-whitish. Legs ochreous-whitish, tibiæ suffused with grey. Fore wings elongate-triangular, costa sinuate, posteriorly moderately arched, apex rounded, hind margin obliquely rounded; dark fuscous: a cloudy subquadrate ochreous-whitish spot in disc before middle; second line very obscure, ochreous-whitish, starting from an ochreous-white spot on costa at four-fifths, running to anal angle, somewhat angulated inwards below middle; cilia dark fuscous, with a cloudy whitish spot above anal angle. Hind wings dark fuscous; cilia dark fuscous, above anal angle broadly ochreous-whitish, with a grey line.

Queensland; one specimen, in indifferent condition (coll. *Lucas*).

Erebangela, *Meyr.*

Erebangela melanauges, Meyr.

Graphicopoda hecate, Butl., Trans. Ent. Soc. Lond., 1886, 421, is a synonym of this.

Strepsimela, *Meyr.*

Strepsimela signiferalis, Wallgr.

Rinecera mirabilis, Butl., Mem. Nat. Ac. Sci., 1884, 95, and *R. nigrescens*, Butl., Trans. Ent. Soc. Lond., 1886, 424, are additional synonyms of this species. The generic name *Rinecera* is orthographically quite incorrect, and if corrected would become *Rhinoceros*; it is therefore inadmissible. Specimens of this species, taken by Mr. J. J. Walker in Tahiti and the Marquesas, show an interesting tendency to a more or less pronounced obsolescence of the white markings in the male. I think that this species, which appears to be

common throughout the whole of the South Pacific islands (occurring nowhere else), and to be liable to gradual local variation throughout its range, would be interesting to study; it would be worth while to take long series of it from each island.

Strepsimela pseudadelpha, n. s.

♂ ♀, 18—21 mm. Head blackish-fuscous, on sides of crown and between antennæ orange-ochreous. Palpi dark fuscous, second joint broadly whitish-ochreous beneath. Antennæ blackish-fuscous, in male with space between tufts also clothed with rough projecting scales, terminal portion beyond second tuft pale ochreous above. Thorax blackish-fuscous. Abdomen blackish-fuscous with a few orange scales, anal segment in male bright orange on sides, with a very large exsertible tuft of whitish-ochreous hairs. Legs in male pale yellow-ochreous, anterior tibiæ with a dark fuscous band, femora without upper tuft, apex of lower tuft blackish-grey; in female wholly dark fuscous. Fore wings rather elongate-triangular, costa slightly sinuate, posteriorly arched, apex obtuse, hind margin oblique, rather strongly bowed; blackish-fuscous, purplish-tinged; in female an indistinct orange-ochreous mark near base; lines darker, tolerably distinct; first from one-fourth of costa to one-third of inner margin, slightly curved, anteriorly edged obscurely in male with paler, in female with orange-ochreous; second irregular, from three-fourths of costa to near anal angle, thence acutely angulated inwards to beneath middle of disc, and again abruptly bent to inner margin at two-thirds, posteriorly obscurely edged with paler, forming a distinct small yellow-ochreous spot on costa; a quadrate discal spot, indicated only by darker lateral margins, preceded and followed by more or less indistinct small cloudy whitish-ochreous marks, sometimes almost obsolete; cilia dark fuscous. Hind wings with colour, discal spot, second line, and cilia as in fore wings; in female sometimes a cloudy orange spot near base, and posterior margin of second line more orange; cilia in male becoming light orange on lower half of hind margin, with a dark fuscous line.

Fiji; several specimens (coll. *Lucas*). Superficially extremely similar to *Ptilœola ulophanes*, Meyr.

Ediodes, *Gn.*

Forehead vertical. Ocelli present. Tongue well-developed. Antennæ three-fourths, in male strongly ciliated (2), basal joint

stout. Labial palpi moderate, arched, ascending, second joint with dense projecting scales beneath, terminal joint moderate, with short projecting scales beneath, obtuse. Maxillary palpi absent. Abdomen in male with anal segment elongate, tuft small, valves retracted. Fore wings with vein 10 rising out of stalk of 8 and 9, 11 very oblique. Hind wings as broad as fore wings; veins 3, 4, 5 closely approximated at base, 7 out of 6 near origin, anastomosing with 8 to near middle; inner margin in male folded beneath, with a pencil of long hairs.

Ædiodes quaternalis, Ld.

Ædiodes quaternalis, Ld., 483, pl. xvii., 1.

Queensland; two specimens (coll. *Lucas*). Also from Amboina and Java.

AGROTERA, *Schrk.*

Forehead rounded, oblique. Ocelli present. Tongue well-developed. Antennæ three-fourths, in male moderately ciliated. Labial palpi moderate, curved, ascending, second joint with dense projecting scales beneath, flatly compressed, terminal joint with acute triangular separate tuft of scales. Maxillary palpi short, filiform, pointed. Fore wings with vein 10 closely approximated to 9, 11 very oblique. Hind wings as broad as fore wings; veins 3, 4, 5 approximated at base, 7 out of 6 near origin, anastomosing with 8 to near middle.

Agrotera effertalis, Walk.

Ædiodes effertalis, Walk., 348.

♀, 17 mm. Head orange, face and palpi dark fuscous. Antennæ pale yellowish, spotted with dark fuscous, apex of basal joint black. Thorax pale yellow, spotted with orange. Abdomen pale yellow, segments irregularly orange towards base, sides posteriorly and apex fuscous. Legs ochreous-whitish, anterior pair with apical half of tibiæ dark fuscous, apex of first and third and entire two apical joints of tarsi black. Fore wings triangular, costa hardly sinuate, slightly arched, apex tolerably rectangular, hind margin obliquely rounded, somewhat sinuate beneath apex; rather dark purple-fuscous; basal area up to first line pale yellow irregularly spotted with orange, with a small blackish spot on costa near base; first line black, irregular, from one-third of costa to two-fifths of inner margin, slightly curved; a small obscure dark fuscous discal spot; costal edge posteriorly suffused with

ochreous-yellowish; second line dark fuscous, waved, from three-fourths of costa to two-thirds of inner margin, rather abruptly sinuate inwards beneath middle; a blackish hind-marginal line; cilia whitish-yellowish, with an apical spot, a subapical dash, median and anal spots dark grey. Hind wings with colour and markings as in fore wings, but purple-fuscous ground colour, together with first line, ceasing abruptly below middle and replaced by whitish-ochreous, in which second line is obscurely indicated with fuscous; no discal spot.

Queensland; one specimen (coll. *Lucas*). Also from Amboina, Ceylon, and India.

NOSOPHORA, *Ld.*

Nosophora chironalis, Walk.

Botys chironalis, Walk., 683; *Nosophora chironalis*, Ld., 407, pl. xiv., 12; *N. ochnodes*, Meyr., Proc. Linn. Soc. N. S. W., 1886, 255.

I was misled into redescribing this species by Walker's express implication that the hind wings were marked with a similar spot to that of the fore wings; on examining his specimen I find that it is unset, and the description of the hind wings doubtless went by conjecture.

PELECYNTIS, *Meyr.*

Pelecyntis abstitalis, Walk.

Also from Tahiti (*Mr. J. J. Walker*).

COMPSOPHILA, *Meyr.*

Compsophila iocosma, Meyr.

Niphadaza bicolor, Butl., Trans. Ent. Soc. Lond., 1886, 423, pl. x., 8, is a synonym of this.

PYCNARMON, *Ld.*

Pycnarmon jaguaralis, Gn.

Also from Cairns, Queensland (coll. *Macleay*).

NOTARCHA, *Meyr.*

Notarcha tharsalea, n. s.

♂ ♀, 29—31 mm. Head and antennæ whitish-ochreous, ciliations of male one-fourth. Palpi whitish-ochreous, apex of basal

joint dark fuscous. Thorax whitish-ochreous, with twelve black spots, arranged one on each shoulder, one on each side, and a dorsal series of four pairs. Abdomen whitish-ochreous, base of second segment, a basal spot on third and fourth, and an apical spot on seventh and anal segments blackish. Legs whitish-ochreous, anterior pair with an apical band on tibiæ and two spots on tarsi black. Fore wings rather elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin obliquely rounded; whitish-ochreous, costa and hind margin orange-tinged; inner margin broadly orange, forming a separate erect spot near base; markings black, sharply defined; an irregular spot on costa near base; first line irregular, from one-fifth of costa, obsolete towards inner margin; a moderate subquadrate spot beneath costa at one-third, a larger transverse-oblong discal spot in middle, and a smaller round spot beneath and between these; second line rather thick, irregular, from costa before three-fourths to near inner margin at two-thirds, but obsolete on orange suffusion, middle third forming a short acute angle outwards, lower third a short curve inwards; a submarginal series of seven roundish spots, smallest and approaching nearest to hind margin in middle; cilia whitish-ochreous, yellow towards base, barred with blackish. Hind wings whitish-ochreous, hind margin orange-tinged; markings black; a roundish discal spot at one-third; second line as in fore wings, but more irregular; a submarginal series of six spots, uppermost much larger and apical; cilia as in fore wings, but not barred on lower third of hind margin.

Cooktown and Townsville, Queensland; eight specimens (coll. *Macleay*).

Notarcha trigalis, Ld.

This name (quoted as a synonym) should be retained for the species formerly quoted by me as *N. orissalis*, Walk. I adopted the name *orissalis* from Lederer's own identification of his species with Walker's; but Mr. Butler has since kindly pointed out to me that neither the specimen in the British Museum collection (which is not, however, Walker's type), nor Walker's original description, can be truly identical with this species. In this conclusion I quite concur. The quotation of Borneo as a locality should also be struck out. Cooktown, Queensland (coll. *Macleay*), is an additional locality.

Conogethes, *Meyr.*

Conogethes lictor, n. s.

♂, 22—23 mm. Head, antennæ, thorax, and abdomen fuscous; antennal ciliations one-third. Palpi dark fuscous, base white. Legs pearly-white. Fore wings elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin oblique, strongly bowed; fuscous; lines slender, dark fuscous, well-marked; first from one-fourth of costa to one-third of inner margin, almost straight; second from three-fifths of costa, triangularly indented inwards immediately below costa, below middle rectangularly bent inwards to beneath discal spot, and again rectangularly bent to inner margin before middle; costa whitish-ochreous from before first line to beyond second, before second line dilated into a triangular blotch reaching half across wing, its anterior edge margined by the transverse linear dark fuscous discal spot; cilia fuscous, with a darker line near base, with a white space above anal angle. Hind wings with colour, discal spot, second line, and cilia as in fore wings; but second line not indented beneath costa, white space of cilia larger.

Townsville, Queensland; several specimens (coll. *Macleay*).

Conogethes ædilis, n. s.

♂, 21 mm. Head, palpi, antennæ, thorax, and abdomen light fuscous; antennal ciliations one. Legs fuscous-whitish. Fore wings elongate-triangular, costa posteriorly gently arched, apex obtuse, hind margin obliquely rounded; fuscous; a small cloudy dark fuscous mark from costa near base; lines slender, somewhat irregular, darker fuscous, indistinct; first from one-fourth of costa to one-third of inner margin, slightly curved; second from two-thirds of costa, where it forms a small spot, irregularly curved outwards, below middle bent inwards to beneath discal spot, and again bent to inner margin beyond middle; costal edge immediately before and beyond second line ochreous-white; discal spot narrow, transverse, somewhat inwards-curved, ochreous-white, laterally dark-margined, touching costal edge before second line: a darker fuscous hind-marginal line; cilia white, with a dark fuscous interrupted line appearing to form bars on basal half, terminal half greyish towards middle of hind margin. Hind wings with colour, second and hind-marginal lines as in fore wings; cilia white, basal half barred with dark fuscous.

Townsville, Queensland; several specimens (coll. *Macleay*).

Pachyzancla, *Meyr.*

Pachyzancla bianoralis, Walk.

Botys bianoralis, Walk., 1001.

♂ ♀, 25—26 mm. Head, palpi, antennæ, thorax, and abdomen rather dark fuscous; palpi white towards base beneath; antennal ciliations two-thirds; abdomen with two whitish rings towards apex. Legs ochreous-whitish, anterior pair yellowish-fuscous above. Fore wings elongate-triangular, costa slightly sinuate, posteriorly arched, apex obtuse, hind margin obliquely rounded; rather dark fuscous, with darker markings; first line from one-fourth of costa to before middle of inner margin, somewhat curved outwards; a dot beneath costa at one-third, and a transverse linear discal spot in middle; second line from costa at two-thirds, slightly curved, rather approaching hind margin, beneath middle abruptly bent inwards to beneath discal spot, thence again abruptly bent to inner margin at two-thirds; an interrupted hind-marginal line; cilia fuscous, with a dark fuscous line, and a small white spot above anal angle. Hind wings with colour, discal spot, second and hind-marginal lines as in fore wings; cilia white, with a dark fuscous basal band.

Queensland; two specimens (coll. *Lucas*). Also from Borneo and Ceylon. In two specimens from Ceylon I do not see the white spot in the cilia of fore wings, but there is no other difference.

Botyodes, *Gn.*

Botyodes asialis, Gn.

Botyodes asialis, Gn., 321; Ld., pl. xiii., 8; *Lygropis sirioxantha*, Meyr., Trans. Ent. Soc. Lond., 1886, 262.

Although I have not obtained a male, I apprehend there is no doubt of this identification. If so, however, either Lederer's generic characters or mine are at fault, but I should like to examine the male before insisting.

Stereocopa, *Meyr.*

Stereocopa scoparialis, Walk.

Also from Carnarvon, West Australia; and Victoria.

PTERYGISUS, *Butl.*

Pterygisus fœdalis, Gn.

Isopteryx fœdalis, Gn., 228, pl. iv., 7; Snell., Tijd. v. Ent., 1872, 96; *I. spilomelalis*, Walk., 403; *Physematia (?) epispila*, Meyr., Trans. Ent. Soc. Lond., 1886, 257.

The ordinary form of this species appears to differ from the Fijian form described by me in having the submarginal markings connected to form a band instead of separate spots, but I now regard this as only local variation. The generic characters given by me at the head of this species are therefore referable to *Pterygisus*, with the correction that the maxillary palpi should be stated as very short, rudimentary.

Queensland; two specimens (coll. *Lucas*). Also from Fiji, Celebes, Java, Ceylon, India, and Madagascar.

HELLULA, *Gn.*

Hellula undalis, F.

Leucochroma phidilealis, Walk., 972, and *Leucinodes exemptalis*, ib., Suppl., 1313, are additional synonyms of this species.

Also from Brisbane, Queensland; Glen Innes (3500 ft.), Bathurst, and Cooma, New South Wales; Albany, Geraldton, and Carnarvon, West Australia. Its range extends also to China and South America.

DYSALLACTA, *Ld.*

Forehead flat, very oblique. Ocelli present. Tongue well-developed. Antennæ three-fourths, in male shortly ciliated (½), basal joint elongate, slender, with a strong subconical horny projection from apex on inner side. Labial palpi moderate, straight, porrected, second joint triangularly scaled, terminal joint concealed. Maxillary palpi moderately long, apex somewhat dilated with scales. Abdomen in male with large exsertible anal tuft of hairs. Posterior tibiæ with outer spurs one-fourth of inner. Fore wings with vein 10 closely approximated to 9, 11 very oblique. Hind wings rather broader than fore wings; veins 3, 4, 5 closely approximated at base, 7 out of 6 near origin, anastomosing with 8 to near middle.

Dysallacta negatalis, Walk.

Phalangiodes negatalis, Walk., 468 ; *Botys monesusalis*, ib., 653; *B. phanasalis*, ib., 727; *Dysallacta negatalis*, Ld., pl. xiii., 6.

Duaringa and Toowoomba, Queensland; Newcastle, New South Wales; in December. Also from Celebes, Java, and India.

Botys, *Tr.*

Botys pharidalis, Walk.

Botys pharidalis (*pharisalis*), Walk., 726.

♂, 20 mm. Head, palpi, and thorax ochreous-brown; palpi white beneath. Antennæ pale ochreous, ciliations two-thirds. Abdomen pale greyish-ochreous. Legs white, femora and anterior tibiæ ochreous-fuscous, posterior tibiæ with outer spurs half inner. Fore wings rather elongate-triangular, costa posteriorly gently arched, apex obtuse, hind margin obliquely rounded; ochreous-brown, with a few scattered dark fuscous scales; markings dark fuscous, tolerably defined; lines slender, waved, first from one-fourth of costa to two-fifths of inner margin, obsolete towards costa, nearly straight, second from three-fourths of costa to two-thirds of inner margin, moderately curved outwards, slightly sinuate beneath costa, triangularly indented at two-thirds to below discal spot; a discal dot close beyond first line, and a small narrow transverse discal spot in middle; cilia grey-whitish, with a thick basal and slenderer median line dark grey. Hind wings fuscous-grey, becoming lighter towards base; faint traces of second line as in fore wings; cilia whitish, with a dark grey basal line.

Sydney, New South Wales; one specimen, in March. Walker's original specimen is in exceedingly bad condition.

Botys phæopteralis, Gn.

Botys licarsisalis, Walk., 686, is another synonym of this species. Mr. Moore appears to think that this species is not Guénée's *phæopteralis*, but he gives no reasons; Lederer and Zeller were satisfied that it is.

Botys hipponalis, Walk.

Asopia hipponalis, Walk., 374; *Botys pigresalis*, ib., 724.

♂, 20 mm. Head, antennæ, thorax, and abdomen pale yellowish-ochreous; antennal ciliations 1½; shoulders narrowly dark fuscous; abdomen with two black dots on third segment. Palpi dark fuscous, beneath white towards base. Legs ochreous-whitish, anterior pair with apex of joints dark grey, posterior tibiæ with outer spurs one-third of inner. Fore wings rather elongate-triangular, costa posteriorly slightly arched, apex obtuse, hind margin rather obliquely rounded; light yellowish-ochreous: costa suffused with dark grey from base to two-thirds; a blackish dot beneath costa near base, and another on inner margin near base; lines slender, irregularly subdentate, dark fuscous; first from one-fifth of costa to two-fifths of inner margin, irregular; second from three-fourths of costa to two-thirds of inner margin, middle third bent outward in an abrupt quadrate projection; a blackish dot beneath costa at one-third, and small blackish narrow transverse discal spot in middle; a rather narrow irregular grey hind-marginal fascia, somewhat excavated below middle; cilia grey-whitish, with a sharp dark grey line. Hind wings with colour, discal spot, second line, hind-marginal fascia, and cilia as in fore wings; hind-marginal fascia becoming obsolete towards anal angle.

Queensland: one specimen (coll. *Lucas*).

Botys epitrota, n. s.

♂, 26 mm. Head, thorax, and abdomen light ochreous-yellowish; shoulders narrowly fuscous; abdomen with two dark fuscous dots on anal segment. Palpi dark fuscous, lower half white. Antennæ yellow-whitish, ciliations one. Legs white, anterior pair with a dot at apex of femora and tarsi, and apical half of tibiæ black; posterior tibiæ with outer middle-spur one-third, outer end-spur one-half inner. Fore wings elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin bowed, oblique; light ochreous-yellowish; an indistinct fuscous subcostal streak from base to two-thirds; a dark fuscous dot at base of costa, and another on inner margin near base; lines dark fuscous, interrupted into dots, first from before one-fourth of costa towards one-third of inner margin, not reaching it, second from three-fourths of costa to beyond middle of inner margin, sinuate above middle, below middle rectangularly bent very widely inwards beneath discal spot; a blackish dot beneath costa near

beyond first line, and a moderately large oval blackish discal spot in middle; a waved fuscous subterminal line running from a spot beneath costa to a larger spot on anal angle; a fuscous apical spot; a hind-marginal row of minute dark fuscous dots; cilia whitish-yellowish. Hind wings with colour, second line, apical spot, hind-marginal dots, and cilia as in fore wings; discal spot somewhat smaller, before middle; subterminal line very faint, without spots.

Newcastle, New South Wales; two specimens (Australian Museum).

ISOCENTRIS, n. g.

Forehead flat, vertical. Ocelli present. Tongue well-developed. Antennæ three-fourths, in male filiform, moderately ciliated. Labial palpi moderate, straight, porrected, triangularly scaled, terminal joint tolerably concealed. Maxillary palpi moderate, filiform. Abdomen in male with slender anal tuft, valves tolerably retracted. Posterior tibiæ with spurs all long and almost equal. Fore wings with vein 10 tolerably approximated to 9, 11 oblique. Hind wings about as broad as fore wings; veins 3, 4, 5 approximated at base, 7 out of 6 near origin, anastomosing with 8 to near middle.

I have formed this genus to include the species which I formerly placed as a separate section (B) of the genus *Botys*; I suggested at the time the possibility of this course, and it now seems desirable. The characters of *Botys*, as given by me, must of course be altered by striking out the words "or all long and equal."

Isocentris æqualis, Ld.

Botys æqualis, Ld., 468, pl. x., 3.

Duaringa, Queensland: and India.

Isocentris rhodophilalis, Walk.

Endotricha rhodophilalis, Walk., Suppl., 1311; *Botys amœnalis*, ib., 1445.

♂, 18 mm. Head yellow, with a fuscous-red spot on each side of crown. Palpi yellow, apex dark fuscous. Antennæ yellowish, ciliations two-thirds. Thorax yellow, with some ferruginous scales. Abdomen yellowish, segmental margins white, second and anal segments mixed with crimson. Anterior femora fuscous-crimson above, white beneath, tibiæ yellow with blackish apex, first joint

of tarsi yellow with white apex, second and third yellow with black apex, second white at base, fourth and fifth white; middle legs yellow, tarsi white; posterior legs white. Fore wings rather elongate-triangular, costa posteriorly moderately arched, apex rectangular, hind margin bowed, oblique; bright yellow; a crimson dot beneath costa near base, a second at one-fifth, and a third on inner margin at one-fifth; lines very slender, indistinct, ferruginous, irregularly sinuate; first from a black dot on costa at one-fourth to inner margin at two-fifths; second from a dark fuscous dot on costa before two-thirds, below middle bent inwards to beneath middle of disc, thence again bent to inner margin at three-fifths; a large irregularly 8-shaped crimson spot in centre of disc, touching angle of second line; a moderate crimson waved submarginal band, attenuated to a point on costa, its middle third curved outwards and partially touching subterminal line; a fine crimson waved subterminal line, and an interrupted crimson hind-marginal line, separated by ferruginous-yellow; cilia silvery-white, basal third crimson, separated by a waved deep crimson line. Hind wings with colour, second line, submarginal band, subterminal and hind-marginal lines, and cilia as in fore wings.

Cape York, Queensland; one specimen (coll. *Macleay*). Also from Ceylon. Mr. Moore quotes *Samea dives*, Butl., Proc. Zool. Soc., 1880, 682, from Formosa, as a synonym of this species; but, although he has probably seen Butler's type, and I have not, I think there must be a mistake somewhere, as I cannot make the description agree at all; for instance, the cilia are given as dark brown.

Mecyna, *Gn.*

Mecyna polygonalis, Hb.

Also from Glen Innes (4500 feet), Newcastle, Bathurst, and Mount Kosciusko (6500 feet), New South Wales; Albany, Geraldton, and Perth, West Australia.

Mecyna reversalis, Gn.

Mecyna reversalis, Gn., 409.

Cape York, Queensland; one specimen (coll. *Macleay*). Also from North and South America. The occurrence of this species in Australia seems difficult to believe; but there can be no question as to the identity of the specimen, which is easily distinguishable from any form

of *M. polygonalis* and *M. deprivalis*, and I see no reason to doubt the authenticity of the locality. Of course some confirmatory evidence would be desirable.

Mecyna miniosalis, Gn.

Ebulea miniosalis, Gn., 362; *E. orseisalis*, Walk., 749.

A true *Mecyna*, with the following individual points of structure in male: Labial palpi moderate; maxillary palpi short, loosely dilated; middle tibiæ rough-scaled, with large loose tuft of hairs lying exposed on inner side; posterior tibiæ with a small tuft of short hairs at base, spurs very long, outer three-fourths of inner. Guénée's specific description is sufficient.

Palm Island (Halifax Bay), Queensland; one specimen (coll. *Macleay*). Also from New Guinea and Java.

Myriotis, *Meyr.*

Myriotis ptoalis, Walk.

Also from Geraldton, West Australia, in November.

Mnesictena, *Meyr.*

Mnesictena pactolina, n. s.

♂ ♀, 20—22 mm. Head, palpi, and thorax deep ochreous-yellow; base of palpi white beneath. Antennæ yellowish, ciliations of male one. Abdomen whitish-ochreous. Legs white, anterior tibiæ and second and third joints of tarsi ochreous-yellow. Fore wings rather elongate-triangular, costa posteriorly moderately arched, apex rectangular, hind margin oblique, somewhat rounded; deep ochreous-yellow; a grey dot towards base in middle; lines slender, waved, fuscous-grey; first from one-fourth of costa to two-fifths of inner margin, somewhat curved; second from two-thirds of costa obliquely outwards, curved round to beneath two-thirds of disc, thence to inner margin at three-fourths; a thick cloudy grey suffused streak from second line above middle to first line below middle; indications of an interrupted grey subterminal line; cilia white, with a blackish-grey basal line, and a small grey apical spot. Hind wings whitish-ochreous; cilia white, basal half whitish-ochreous.

Cooktown and Townsville, Queensland; Port Darwin, North Australia; four specimens.

Mnesictena celatalis, Walk.

Botys celatalis, Walk., 657; *B. suavalis*, ib., Suppl., 1448.

♀, 26 mm. Head and thorax yellow-ochreous, sides of face narrowly white. Palpi ochreous-brown, beneath white towards base. Antennæ whitish-ochreous. Abdomen ochreous-whitish. Legs white, anterior femora pale ochreous above, anterior tibiæ ochreous at base and with a broad ochreous or dark grey subapical band. Fore wings rather elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin oblique, slightly rounded; light ochreous-yellow; costa suffused with brownish-ochreous; markings brownish-ochreous: first line from before one-fourth of costa to two-fifths of inner margin, somewhat bent below middle; a dot beneath costa at one-third, and a small curved linear transverse discal spot in middle; second line from two-thirds of costa towards anal angle, slightly curved outwards, below middle rectangularly bent inwards to beneath discal spot, and again rectangularly bent to inner margin before two-thirds, somewhat indented below costa and above inner margin; a cloudy subdentate subterminal line from three-fourths of costa to anal angle, thickest above, indented inwards above lower extremity; a cloudy irregular hind-marginal line; cilia ochreous-yellow, tips paler. Hind wings with colour, second, subterminal, and hind-marginal lines, and cilia as in fore wings; a small indistinct cloudy discal spot, touching angle of second line.

Queensland; one specimen (coll. *Lucas*). Also from Java and Ceylon.

Myriostephes, *Meyr.*

Myriostephes phœniccalis, Hb.

Hæmatia phœniccalis, Hb., Zut., 115, 116; *Rhodaria phœniccalis*, Gn., 173; *R. flegialis*, Walk., 316; *R. panopealis*, ib., 318; *Botys cæcilialis*, ib., 581; *B. onythesalis*, ib., 734; *Rhodaria ocellusalis*, ib., 923; *R. noraxalis*, ib., 926; *Asopia largalis*, ib., 938; *Rhodaria juncturalis*, ib., Suppl., 1283; *R. concatenalis*, ib., 1284; *Myriostephes heliamma*, Meyr., Trans. Ent. Soc. Lond., 1885, 448.

Also from India, China, West Africa, the West Indies, and North and South America. I consider all the forms quoted above identical; but there is more or less

variation in the extent of the yellow suffusion, tending to produce local forms, which nevertheless I do not find constant. Generally there is a tendency in Indo-Malayan and Australian forms to show a yellow submarginal streak, which is usually absent in American specimens; but the difference seems unreliable.

Myriostephes achœalis, Walk.

Botys achœalis (*achœusalis*), Walk., 1007.

♂ ♀, 25—27 mm. Head orange, lower part of face dark fuscous. Palpi dark fuscous, lower longitudinal half orange. Antennæ whitish-ochreous, basal joint orange with a black dot, ciliations of male 1½. Thorax orange, shoulders narrowly black. Abdomen orange, with a black band at three-fourths. Legs pale orange, anterior tibiæ banded with black. Fore wings very elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin obliquely rounded; orange; markings blackish, slightly bluish-tinged; a moderate streak along costa from base to two-thirds; a rather narrow straight fascia from two-fifths of costa to two-fifths of inner margin, beneath costal streak dilated to contain a dot of ground colour; a rather narrow fascia from three-fifths of costa to anal angle, much dilated beneath, and confluent with an irregular moderate hind-marginal fascia; cilia dark grey. Hind wings orange; a moderate somewhat irregular blackish hind-marginal fascia, narrowed beneath; cilia dark grey.

Sydney, New South Wales; several specimens in February and March (coll. *Macleay*). Rather a discordant species; but I find the resemblance to *Metallarcha* apparently superficial only.

Deuterarcha, *Meyr.*

Deuterarcha xanthomela, Meyr.

Also from Toowoomba, Queensland, in December. *Emprepes insignis*, Butl., Trans. Ent. Soc. Lond., 1886, 431, is a synonym of this.

Metallarcha, *Meyr.*

Metallarcha tetraplaca, n. s.

♂ ♀, 19—22 mm. Head yellow, frontal projection flattened-conical. Palpi blackish, lower longitudinal half yellow. Antennæ pale yellowish. Thorax yellow, shoulders dark fuscous. Abdomen

light ochreous-yellow. Legs dark fuscous, posterior pair yellowish. Fore wings elongate-triangular, costa posteriorly moderately arched, apex rounded, hind margin very obliquely rounded; clear yellow; markings light ashy-grey, margined with blackish; a streak along costa from base to four-fifths, its apex attenuated; first and second lines moderately broad, fascia-like; first from beyond one-third of costa to two-fifths of inner margin, almost straight; second from costa near apex, continued near and parallel to hind margin to below middle, thence abruptly bent in to beneath middle of disc, sometimes almost reaching first line, and curved strongly round to inner margin at three-fourths; a perpendicular bar from three-fifths of costa to curve of second line, representing discal spot; a black hind-marginal line; cilia grey. Hind wings fuscous-grey; costa suffusedly whitish-ochreous, except on a bar before middle and another almost apical; apex and upper half of hind margin narrowly and irregularly pale ochreous-yellowish, sometimes continued further towards anal angle; cilia whitish-ochreous.

South Australia (probably near Gawler); several specimens (coll. *Macleay*). Intermediate between *M. epichrysa* and *M. eurychrysa*.

Metallarcha eurychrysa, Meyr.

Having obtained a series of specimens, I add the following points to the description:—

♂ ♀, 20—27 mm. Ground colour of fore wings bright yellow; costal streak usually not extending beyond four-fifths; anterior fascia slightly sinuate; second fascia containing a small spot of ground colour on inner margin; hind-marginal yellow dots often nearly obsolete; cilia yellow, with a dark fuscous line, sometimes nearly obsolete, and a dark fuscous apical suffusion. Ground colour of hind wings bright ochreous-yellow.

Geraldton and Albany, West Australia; locally common in November.

Metallarcha pseliota, n. s.

♂ ♀, 18—20 mm. Head deep yellow, frontal projection flattened-conical. Palpi blackish, lower longitudinal half deep yellow. Antennæ dark fuscous. Thorax deep yellow, shoulders dark fuscous. Abdomen ochreous-yellow. Legs blackish, posterior pair ochreous-yellow. Fore wings very elongate-triangular, costa gently arched, apex rounded, hind margin very obliquely rounded;

white, slightly ochreous-tinged: markings blackish; a somewhat irregular streak along costa from base to four-fifths, with a short rounded projection on lower edge before middle; a semi-oval spot on inner margin at one-third, beyond which the inner margin is ochreous-yellow; lines narrow, lower extremities meeting and coalescing on inner margin beyond middle, first from costa at one-third, straight, second from costa at five-sixths, below middle rectangularly bent inwards, forming a short curve beneath two-thirds of disc; a narrow bar from two-thirds of costa to curve of second line, representing discal spot; a blackish hind-marginal band, its anterior edge irregular, closely approaching second line throughout, containing a submarginal series of seven subconfluent round deep ochreous-yellow spots; cilia grey, with a darker line near base. Hind wings ochreous-yellow; a dark fuscous irregular fascia from apex towards two-thirds of inner margin, rapidly attenuated and not nearly reaching it; a dark fuscous hind-marginal line not reaching anal angle; cilia pale ochreous-yellowish.

South Australia (probably near Gawler); several specimens (coll. *Macleay*).

Eurycreon, *Ld.*

Eurycreon ochrochoa, n. s.

♂ ♀, 18 mm. Head, palpi, antennæ, thorax, and abdomen pale ochreous; frontal projection rounded; palpi white beneath towards base; antennal ciliations of male one. Legs white, anterior pair fuscous above. Fore wings rather elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin oblique, somewhat rounded; light yellow-ochreous, in female irrorated with pale red-brownish; lines slender, cloudy, dark fuscous; first from inner margin at two-fifths, becoming obsolete towards costa; second slightly waved, from three-fourths of costa, slightly indented above middle, below middle obtusely bent inwards to near middle of disc, thence again rectangularly bent to inner margin at two-thirds; a small roundish discal spot obscurely outlined with red-brownish; cilia light grey, with a somewhat darker line near base. Hind wings with ground colour, second line, and cilia as in fore wings.

Duaringa, Queensland; two specimens sent by Mr. G. Barnard. Nearest to *E. familiaris*, and equally or more short-winged; easily distinguished from it by the ochreous-yellowish colouring, without grey suffusion in hind wings, and the grey cilia.

Eurycreon homogama, n. s.

♂ ♀, 16—20 mm. Head, antennæ, and thorax pale ochreous; frontal projection obtusely rounded; antennal ciliations of male two-thirds. Palpi brownish-ochreous, lower longitudinal half white. Abdomen whitish-ochreous. Legs in male whitish, in female whitish-ochreous, anterior pair brownish-ochreous above. Fore wings very elongate-triangular, costa sinuate, apex obtuse, hind margin very obliquely rounded; in male whitish-ochreous, brownish-tinged, costa obscurely suffused with pale brownish-ochreous, in female wholly pale brownish-ochreous; lines cloudy, fuscous; first from one-fourth of costa to one-third of inner margin, indistinct, towards costa obsolete; second from three-fourths of costa, where it is darkest, above middle shortly indented inwards, below middle obtusely bent inwards to beneath discal spot, and again obtusely bent to two-thirds of inner margin; a small cloudy indistinct ochreous-fuscous spot beneath costa before middle, and a somewhat larger subquadrate discal spot outlined with ochreous-fuscous beyond middle; cilia whitish-ochreous sprinkled with brownish-ochreous, extreme tips fuscous. Hind wings with colour, second line, and cilia as in fore wings.

Carnarvon, West Australia; four specimens in October. Allied to the equally long-winged *E. xenogama* and *E. aphrarcha*, but distinguished from both by its ochreous colouring; the male of *E. xenogama* is very similar to this species, but the female extremely different.

Eurycreon xenogama, Meyr.

Also from Perth and Geraldton, West Australia, in November.

Eurycreon aphrarcha, n. s.

♂, 16—19 mm. Head, antennæ, thorax, and abdomen greyish-ochreous irrorated with dark grey; frontal projection rounded; antennal ciliations two-thirds. Palpi greyish-ochreous irrorated with black, lower longitudinal half white. Legs whitish, anterior pair dark fuscous. Fore wings very elongate-triangular, costa sinuate, apex obtuse, hind margin very obliquely rounded; rather light fuscous, becoming darker towards basal two-thirds of costa; lines irregular, cloudy, blackish, tolerably distinct; first from one-fourth of costa to one-third of inner margin; second from three-fourths of costa, above middle shortly indented inwards, below middle obtusely bent inwards to beneath discal spot, and again

obtusely bent to inner margin at three-fifths, preceded and followed by a more or less perceptible white irroration, especially towards costa; an indistinct dark fuscous dot beneath costa before middle, and a small subquadrate discal spot obscurely outlined with cloudy blackish beyond middle; a hind-marginal row of cloudy blackish dots; cilia light greyish-ochreous, with two grey lines. Hind wings pale greyish-ochreous, irregularly irrorated with fuscous; an obscure fuscous discal dot, sometimes obsolete; second line fuscous, formed as in fore wings; cilia ochreous-whitish, with a grey line near base.

Carnarvon, West Australia; four specimens in October.

Eurycreon strangalota, n. s.

♂, 19 mm. Head and thorax dark fuscous, irrorated with whitish-ochreous; frontal projection rounded. Palpi dark fuscous, beneath white towards base. Antennæ greyish-ochreous, ciliations one-half. Abdomen pale greyish-ochreous, irrorated with dark fuscous on sides of back, segmental margins white. Legs greyish-ochreous suffused with dark fuscous, apex of joints whitish, posterior tibiæ whitish. Fore wings elongate-triangular, costa gently arched on posterior half, apex obtuse, hind margin very obliquely rounded; pale whitish-fuscous, coarsely irrorated with dark fuscous; first and second lines strongly marked, irregular, blackish; first from one-fourth of costa to one-third of inner margin, somewhat angulated in middle; second from three-fourths of costa, somewhat indented above middle, near above anal angle abruptly bent in upwards to beneath discal spot, thence again abruptly curved round to two-thirds of inner margin; a small round pale spot strongly outlined with blackish beneath costa near beyond first line, and a transverse-oblong pale discal spot strongly outlined with blackish beyond middle; a blackish dot on costa above discal spot; a cloudy irregular blackish hind-marginal line; cilia grey-whitish, with a cloudy dark grey line tending to be interrupted and to form bars, costal cilia whitish with two cloudy blackish dots between second line and apex. Hind wings with colour, second and hind-marginal lines, and cilia as in fore wings; a narrow transverse strongly marked blackish discal spot before middle.

Bathurst, New South Wales; one specimen, in March. Allied to *E. capnochroa*; differs by the larger size, pale centre of subcostal spot beyond first line, reduction of subquadrate ante-apical spots of costa to cloudy dots,

origin of second line from costa nearer apex, paler cilia, and other minor points.

Eurycreon hemicirca, n. s.

♂, 19 mm. Head, palpi, and thorax dark fuscous, irrorated with whitish-ochreous; frontal projection small, rounded. Antennæ pale greyish-ochreous spotted with fuscous, ciliations two-thirds. Abdomen pale greyish-ochreous, irregularly irrorated with dark fuscous. Anterior legs fuscous, tibiæ and tarsi ringed with ochreous-whitish; middle and posterior femora fuscous-whitish with dark fuscous subapical rings, tibiæ whitish with dark fuscous subbasal and subapical bands, tarsi dark fuscous, apex of joints whitish. Fore wings elongate-triangular, costa posteriorly gently arched, apex obtuse, hind margin very obliquely rounded; pale whitish-fuscous, irregularly suffused with pale fuscous and irrorated with dark fuscous; lines rather irregular, strong, dark fuscous; first from one-fourth of costa to one-third of inner margin; second from four-fifths of costa, tolerably parallel to hind margin, somewhat sinuate above middle, at two-thirds obtusely bent inwards to beneath discal spot, and again rectangularly bent to two-thirds of inner margin; a small round spot strongly outlined with dark fuscous beneath costa beyond first line, and a transverse-oblong discal spot strongly outlined with dark fuscous beyond middle; three semicircular rings outlined strongly with dark fuscous on costa, first above discal spot, third immediately preceding and confluent with second line; a hind-marginal series of cloudy dark fuscous lunules; cilia pale whitish-ochreous, obscurely barred with grey, and with a cloudy dark grey line. Hind wings with colour, second line and following shade, hind-marginal lunules, and cilia as in fore wings; a dark fuscous oblique transverse-linear discal spot before middle.

Launceston, Tasmania; one specimen, in January. Very similar to *E. strangulata*, but with second line of fore wings rising from still nearer apex, and distinguished from all species of the genus by the semicircular dark rings on costa.

Eurycreon capnochroa, Meyr.

Also from Glen Innes and Mount Kosciusko (3600 feet), New South Wales; Hobart, Tasmania.

Eurycreon liophæa, n. s.

♂, 15 mm. Head and thorax fuscous; frontal projection rounded-conical. Palpi fuscous, lower longitudinal half white,

Antennæ light fuscous, ciliations one-half. Abdomen pale greyish-ochreous irrorated with fuscous, segmental margins white. Anterior legs dark fuscous, apex of tarsal joints whitish; middle and posterior legs white. Fore wings rather elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin rather oblique, rounded beneath; fuscous; lines slender, dark fuscous; first from one-fourth of costa to one-third of inner margin, indistinct; second from three-fourths of costa, slightly indented above middle, near above anal angle abruptly bent in upwards to beneath discal spot, and again rectangularly bent to two-thirds of inner margin; a very small round spot finely outlined with dark fuscous beneath costa beyond first line, and a curved oblong-transverse discal spot finely outlined with dark fuscous beyond middle; a cloudy dark fuscous somewhat interrupted hind-marginal line; cilia whitish-grey, with a cloudy grey interrupted line. Hind wings with colour, second and hind-marginal lines, and cilia as in fore wings; a cloudy oblique transverse-linear dark fuscous discal spot before middle.

Sydney, New South Wales; one specimen. Very like *E. capnochroa*, but quite without costal spots, bars in cilia, or white centre of discal spot.

Eurycreon ochreipennis, Butl.

Pterygisus ochreipennis, Butl., Trans. Ent. Soc. Lond., 1886, 429, pl. x., 9.

This is the insect formerly alluded to by me as Felder's *Botys beatalis*; I now think this identification erroneous, and regard Felder as having probably intended a species of *Metallarcha*.

Eurycreon ateloxantha, n. s.

♂, 10—11 mm. Head and thorax fuscous; frontal projection small, rounded. Palpi dark fuscous, lower longitudinal half white. Antennæ pale fuscous, ciliations two-thirds. Abdomen dark fuscous, mixed with yellowish towards base, anal tuft ochreous-whitish. Anterior legs dark fuscous; middle and posterior legs ochreous-whitish. Fore wings elongate-triangular, costa posteriorly slightly arched, apex obtuse, hind margin oblique, rounded beneath; whitish-ochreous, suffusedly irrorated with dark fuscous, appearing rather dark fuscous, with deep reddish-ochreous reflections; lines blackish fuscous: first from one-fourth of costa to one-third of inner margin, rather irregular; second from three-fourths of costa,

slightly indented above middle, near above anal angle abruptly bent inwards to below discal spot, thence again rectangularly bent to two-thirds of inner margin; a small roundish spot beneath costa beyond first line, and a transverse-oblong discal spot, both strongly outlined with blackish-fuscous; second line preceded and followed on costa by a pale spot; a blackish-fuscous hind-marginal line; cilia grey-whitish, with a dark fuscous line. Hind wings ochreous-yellow; base and centre of disc irrorated with dark fuscous; second line and cilia as in fore wings; a transverse linear dark fuscous discal spot before middle; space between second line and hind margin wholly suffused with dark fuscous, except towards anal angle.

Toowoomba (2000 feet), Queensland; two specimens in December.

Eurycreon lamprodeta, Meyr.

Aporocosmus bracteatus, Butl., Trans. Ent. Soc. Lond., 1886, 399, is a synonym of this. I daresay the Australian locality quoted by Butler may be correct, but I should like confirmation.

Eurycreon massalis, Walk.

Also from Rosewood, Queensland; Sydney, New South Wales.

CRIOPHTHONA, *Meyr.*

Criophthona harmodia, n. s.

♂, 15—18 mm. Head and thorax ochreous-brown. Palpi dark fuscous, beneath white towards base. Antennæ fuscous, ciliations one. Abdomen fuscous, anal tuft pale greyish-ochreous. Legs fuscous. Fore wings very elongate-triangular, costa sinuate, apex obtuse, hind margin very obliquely rounded; shining ochreous-fuscous; lines obscurely darker; first from one-fourth of costa to one-third of inner margin, very indistinct, sometimes anteriorly whitish-edged near inner margin; second from three-fourths of costa, somewhat indented above middle, at two-thirds obtusely bent inwards to beneath discal spot, and again rectangularly bent to two-thirds of inner margin, posteriorly more or less partially finely edged with white, sometimes forming a spot on costa; a roundish spot very obscurely outlined with darker before middle, and a subquadrate spot somewhat more distinctly outlined beyond middle, intervening space sometimes obscurely whitish; cilia shining grey. Hind wings fuscous-grey, towards apex darker;

second line somewhat darker, formed as in fore wings; cilia grey-whitish, with a cloudy grey line.

Albany, West Australia; three specimens, in December.

SEDENIA, *Gn.*

Sedenia rupalis, Gn.

Also from Glen Innes, Bathurst, and Cooma, New South Wales; Launceston, Tasmania; Mount Lofty, South Australia; Geraldton, West Australia.

Sedenia cervalis, Gn.

Also from Glen Innes and Cooma, New South Wales; Wimmera, Victoria.

Sedenia aspasta, n. s.

♂, 12—15 mm. Head and thorax fuscous. Palpi dark fuscous, beneath white. Antennæ light fuscous, ciliations two. Abdomen fuscous, segmental margins pale yellowish. Legs dark fuscous, posterior pair yellow-whitish. Fore wings very elongate-triangular, costa almost straight, apex rounded, hind margin very oblique, hardly rounded; fuscous, ochreous-tinged, sprinkled with blackish; lines hardly perceptibly darker, almost obsolete; first from one-fourth of costa to one-third of inner margin; second from five-sixths of costa to very near anal angle, abruptly bent in thence to beneath two-thirds of disc, and again rectangularly bent to inner margin near anal angle; cilia fuscous. Hind wings ochreous-yellow; a narrow dark fuscous border extending completely round wing, but nearly obsolete on inner margin; cilia pale fuscous-grey.

Carnarvon, West Australia; two specimens in October.

TRITÆA, *Meyr.*

Tritæa ustalis, Walk.

Also from Rosewood, Queensland; Glen Innes, Bathurst, and Cooma, New South Wales; Wimmera, Victoria; Geraldton, West Australia; from October to April.

Nymphula sordida, Butl., Trans. Ent. Soc. Lond., 1886, 432, is an additional synonym of this.

SCOPARIADÆ.

ECLIPSIODES, *Meyr.*

Eclipsiodes drosera, n. s.

♂ ♀, 18—20 mm. Head, palpi, antennæ, thorax, abdomen, and legs dark fuscous, slightly mixed with white; forehead with a short cone, sometimes obsolete; palpi rather long, terminal joint concealed. Fore wings triangular, costa almost straight, apex obtuse, hind margin rather obliquely rounded; dark fuscous, with some scattered white scales tending to form a cloudy patch on costa before second line and another on anal angle; lines subdentate, black; first from one-third of costa to two-fifths of inner margin, somewhat curved; second from three-fourths of costa to three-fifths of inner margin, sinuate inwards below middle, followed on costa and sometimes on inner margin by a small cloudy white spot; orbicular and claviform roundish, outlined with blackish, obscure, touching first line; reniform tolerably 8-shaped, outlined with blackish, almost touching second line beneath; a cloudy darker shade near beyond and parallel to second line; an irregular white marginal line, sometimes obsolete, margined obscurely with blackish; cilia grey, with a dark grey line. Hind wings dark fuscous; two or three cloudy whitish spots before middle, and a curved series of small white partially confluent spots beyond middle, all sometimes obsolete; cilia as in fore wings.

Victoria; several specimens (coll. *Lucas*).

Eclipsiodes crypsixantha, Meyr.

Also from Duaringa, Queensland; Blackheath (3500 feet) and Bathurst, New South Wales.

NYCTARCHA, *Meyr.*

Nyctarcha ophideres, Walk.

Also from Duaringa, Queensland.

Nyctarcha paracentra, n. s.

♀, 15 mm. Head, palpi, antennæ, thorax, abdomen, and legs blackish; palpi white beneath towards base; apex of tarsal joints yellow-whitish. Fore wings suboblong, rather dilated posteriorly, costa almost straight, apex obtuse, hind margin obliquely rounded; dark fuscous, purplish-tinged; a cloudy outwardly oblique whitish spot on costa at two-thirds, reaching half across wing; a short

white erect linear mark on inner margin at three-fourths; cilia dark fuscous. Hind wings light orange; a small dark fuscous basal patch, narrowly extended along inner margin to anal angle; a moderate blackish hind-marginal border, its anterior edge semicircularly excavated on upper half, and rather prominent below middle; cilia dark fuscous, on inner margin pale yellowish.

York, West Australia; one specimen, in October, not in very good condition; it is immediately separated from the other species with orange hind wings by the blackish base. I have seen a second specimen, also West Australian.

SCOPARIA, *Haw.*

Scoparia threnodes, n. s.

♂ ♀, 15—17 mm. Head, palpi, antennæ, and thorax blackish; palpi 2½, base white; antennal ciliations of male one-half; thorax with a forwards-angulated white transverse bar very near posterior extremity. Abdomen whitish-grey, apex whitish-ochreous. Legs blackish, apex of joints white. Fore wings elongate, triangular, costa slightly arched, apex rounded, hind margin obliquely rounded; grey, coarsely irrorated with black and with some scattered white scales, appearing almost blackish; first line indistinct, whitish, posteriorly black-margined, somewhat curved; orbicular and claviform roundish, black-margined but hardly traceable, touching first line; reniform 8-shaped, black-margined, tolerably distinct except beneath, often connected with costa by a whitish suffusion; second line very indistinct, whitish, anteriorly black-margined; subterminal line rather broad, cloudy, white, more or less distinct, almost touching second line in middle; an irregular white marginal line; cilia grey, with a blackish line near base, narrowly barred with white, extreme tips white. Hind wings 1¼; pale grey, towards hind margin somewhat darker, with a faint post-median line; cilia grey-whitish, with a grey line.

Perth, West Australia; five specimens, in November. Nearest to *S. anthracias*, from which it differs by the white thoracic marking, traceable white lines of fore wings, and other points. In my tabulation it falls under the same head with *S. chalicodes*, from which it differs widely by the dense black irroration.

Scoparia chiasta, Meyr.

Also from Melbourne, Victoria.

Scoparia spelæa, Meyr.

Also from Toowoomba, Queensland.

Scoparia plagiotis, n. s.

♀. 19—20 mm. Head grey mixed with white. Palpi four, grey mixed with black, white towards base beneath. Antennæ pale grey. Thorax ochreous-grey, somewhat mixed with blackish. Abdomen whitish-grey, apex whitish-ochreous. Legs dark fuscous irrorated with white, apex of joints white. Fore wings elongate, narrow, subtriangular, costa hardly arched, apex obtuse, hind margin nearly straight, oblique, rounded beneath; light grey, ochreous-tinged, partially irrorated with white; veins rather strongly and irregularly but incompletely marked with black; first line cloudy, white, strongly curved, posteriorly blackish-margined near costa; orbicular and claviform very small, elongate-oval, outlined with black, touching first line; reniform 8-shaped, very indistinctly blackish-margined; second line cloudy, white; subterminal line cloudy, white, touching second line in middle; cilia whitish, obscurely barred with ochreous-grey, and with a cloudy grey line. Hind wings $1\frac{2}{3}$; whitish-grey, hind margin scarcely darker; cilia white, with a pale grey line.

Campbelltown, Tasmania; two specimens in December. Not very near any other; may be placed between *S. cleodoralis* and *S. manganeutis*. In tabulation falls with *S. chalicodes*; easily separated by the distinct white lines.

Tetraprosopus, *Butl.*

Tetraprosopus Meyrickii, Butl.

Also from Glen Innes (4500 feet), Newcastle, and Bathurst, New South Wales.

Xeroscopa, *Meyr.*

Xeroscopa philonephes, Meyr.

Also from Mount Kosciusko (4700 feet), New South Wales.

Xeroscopa nephelitis, n. s.

♂ ♀, 22—24 mm. Head, antennæ, thorax, abdomen, and legs glossy grey, slightly ochreous-tinged; antennal ciliations of male one-half; posterior tibiæ ochreous-white. Palpi two, fuscous-grey,

base white. Fore wings elongate, subtriangular, costa almost straight, apex rounded, hind margin rather obliquely rounded; glossy ochreous-grey, irrorated with grey-whitish; cilia glossy whitish-grey, with a faint darker line near base. Hind wings whitish-grey, ochreous-tinged; a somewhat darker very obscure hind-marginal band; cilia whitish, with a grey line.

Mount Kosciusko (5000—6000 feet), New South Wales; four specimens, in January.

CRAMBIDÆ,

DIATRŒA, *Guild.*

Diatræa parramattella, Meyr.

Chilo parramattellus, Meyr., Proc. Linn. Soc. N. S. W., 1878, 178.

CALAMOTROPHA, *Z.*

Calamotropha dielota, Mey.

Also from Queensland (coll. *Lucas*).

PTOCHOSTOLA, *Meyr.*

Ptochostola microphæella, Walk.

Crambus microphæellus, Walk., Suppl., 1758; *Ptochostola dimidiella*, Meyr., Proc. Linn. Soc. N. S. W., 1878, 190; ib., 1882, 154.

Also from Brisbane, Queensland; Bathurst and Blackheath, New South Wales; Melbourne, Victoria; Launceston and Hobart, Tasmania; Penola, South Australia; Albany, West Australia; from September to April. By an error of observation I formerly recorded this name of Walker's as a synonym of *Crambus cuneiferellus*.

THINASOTIA, *Hein.*

Thinasotia claviferella, Walk.

Aquita claviferella, Walk., Suppl., 1765; *Aphomia strigosa*, Butl., Proc. Zool. Soc., 1877, 398, pl. xliii., 10; *Crambus strigosus*, Meyr., Trans. N. Zeal. Inst., 1882, 31.

Melbourne, Victoria; Hobart, Tasmania; besides the recorded New Zealand localities. The distribution of this species is quite exceptional.

Thinasotia latirittalis, Walk.

Also from Deloraine and Georges Bay, Tasmania; Ardrossan, South Australia; Perth, West Australia.

HEDNOTA, *Meyr.*

Hednota pleniferella, Walk.

Also from Deloraine, Tasmania.

Hednota toxotis, n. s.

♂ ♀, 13—19 mm. Head pale ochreous, with a white line above eyes, cone slight. Palpi three, dark ochreous-fuscous mixed with white, beneath white. Antennæ grey, in male triangularly dentate, teeth ending in tufts of long cilia. Thorax brownish-ochreous. Abdomen grey. Legs grey-whitish, anterior tibiæ greyish-ochreous. Fore wings elongate, subtriangular, costa gently arched, apex round-pointed, hind margin oblique, sinuate-indented in middle; veins 4 and 5 separate, 11 bent; in male ochreous-brown, in female greyish-ochreous, partially somewhat irrorated with white, sometimes becoming white on posterior half; a blackish irroration towards middle of disc; a more or less defined narrow snow-white median longitudinal streak from base to hind margin, partially black-margined, suffusedly interrupted towards base and cut by discal spot; a moderate oval leaden-metallic discal spot beyond middle, suffusedly margined with black; a slightly sinuate leaden-metallic transverse line from five-sixths of costa to anal angle; a white hind-marginal fascia, anterior edge convex and preceded by a cloudy blackish irroration which is cut by the metallic transverse line, containing five or six elongate black hind-marginal marks on veins; cilia glossy grey, basal half whitish with a black line near base, except on lower third of hind margin, where it is wholly glossy metallic-grey. Hind wings with veins 4 and 5 coincident; in male dark grey, in female grey; cilia grey-whitish, with a grey line.

Melbourne, Victoria; several specimens (coll. *Lucas*). Somewhat allied to *H. pedionoma* and *H. longipalpella*, but very distinct.

Hednota pedionoma, Meyr.

Also from Melbourne and the Wimmera, Victoria; Launceston, Tasmania.

Hednota gelastis, n. s.

♂, 9 mm. Head, palpi, thorax, and abdomen grey-whitish irrorated with dark fuscous; cone slight; palpi four. Antennæ greyish, filiform, moderately ciliated (1). Legs fuscous, posterior pair grey-whitish. Fore wings elongate-triangular, costa gently arched, apex rounded, hind margin extremely oblique, almost straight; veins 4 and 5 separate; grey-whitish, irrorated with dark fuscous; two thick ochreous-brown transverse lines, partially irrorated with blackish, first from two-fifths of costa to two-fifths of inner margin, somewhat curved outwards, second from three-fourths of costa to four-fifths of inner margin, upper half moderately curved outwards; an obscure white discal dot between them; cilia grey-whitish, with a blackish line near base and grey subapical line. Hind wings subovate, hardly broader than fore wings; veins 4 and 5 from a point; grey; cilia light grey.

Campbelltown, Tasmania; one specimen in December. The smallest and most inconspicuous species, abnormal in appearance from the smaller hind wings and peculiar markings.

Hednota panselenella, Meyr.

Also from Hobart, Tasmania.

Hednota acontophora, Meyr.

Also from Hobart, Tasmania; Adelaide, South Australia.

Hednota asterias, n. s.

♂, 27 mm. Head ferruginous, face fuscous, cone moderate. Palpi 4½, fuscous, white towards base beneath. Antennæ grey, subdentate, very shortly ciliated (⅓). Thorax ashy-grey. Abdomen grey-whitish, ochreous-tinged. Legs grey, posterior pair grey-whitish. Fore wings elongate, moderately dilated, subtriangular, costa gently arched, apex obtuse, hind margin hardly perceptibly sinuate, slightly oblique, rounded beneath; veins 4 and 5 separate; glossy grey, slightly ochreous-tinged, somewhat irrorated with whitish-grey; margins of veins marked by fine unevenly scattered black scales; a round clear white discal dot beyond middle; cilia glossy light grey, with a darker ochreous-grey line near base. Hind wings with veins 4 and 5 short-stalked; beneath with a longitudinal fold near inner margin, its edge fringed with rough hairs on anal half; whitish-grey, towards hind margin scarcely darker; cilia grey-whitish, with a light grey line.

Albany, West Australia; one specimen in December. *Crambus demissalis*, Walk., is represented in the British Museum collection by a rather poor specimen of this species, but it is apparent that there must be some error; Walker describes his species as silvery-white, with black discal and marginal points, and in other respects quite distinct; his name may therefore be dropped until the type is discovered. As an instance of confusion of types in the same genus, I may mention that Walker's *Crambus cuneiferellus* was at one time represented in the collection by a specimen of the absurdly different *Thudaca obliquella*; his description being really recognisable enough.

EROMENE, *Hb.*

Eromene ocellea, Hw.

Mount Lofty, South Australia; one specimen taken by Mr. E. Guest. I was extremely surprised to receive this species, and inquired particularly into its capture; Mr. Guest informed me that he took it himself in 1885, and had never met with a second specimen, and suggested that, as the locality was within a hundred yards of a grocery store, the pupa might have been imported in straw from the South of Europe. I am disposed to think that this is not altogether improbable, but more evidence is required. The species is recorded from Europe, North Africa, Madeira, and North America; it therefore possesses some means of distribution.

GALLERIADÆ.

HETEROMICTA, *Meyr.*

Heteromicta pachytera, Meyr.

Also from Sydney, New South Wales; Melbourne, Victoria; Quorn, South Australia; Geraldton, West Australia. The sexes are similar; size varies from 16 to 26 mm.

MELISSOBLAPTES, *Z.*

The two following species are true *Melissoblaptes*, as distinguished from *Heteromicta*.

Melissoblaptes sordidella, Walk.

Gyrtona sordidella, Walk., Suppl., 1723.

♀, 24 mm. Head, palpi, and thorax greyish-ochreous suffusedly irrorated with dark fuscous. Antennæ fuscous, ringed with paler. Abdomen ochreous-whitish, segments suffused with grey except on margins. Legs dark fuscous, apex of joints ochreous-whitish, posterior pair suffused with ochreous-whitish. Fore wings elongate, suboblong, costa moderately arched, apex obtuse, hind margin rather obliquely rounded; fuscous, somewhat sprinkled irregularly with ochreous-whitish, and coarsely irrorated with black; an obscure darker fascia near before and parallel to first line; lines thick, cloudy, dark fuscous; first from two-fifths of costa to before middle of inner margin, somewhat curved; second from close beyond middle of costa to three-fourths of inner margin, rather sinuate inwards beneath costa, almost rectangularly angulated in middle; a dark fuscous discal dot between them; a cloudy darker band between second line and hind margin, parallel to second line; a hind-marginal row of small dark fuscous subconfluent spots; cilia fuscous, with ochreous-whitish and black points. Hind wings whitish-fuscous, somewhat darker posteriorly; a fuscous hind-marginal line interrupted by whitish-ochreous dots; cilia whitish-fuscous.

Blackheath (3500 feet), New South Wales; one specimen in February.

Melissoblaptes ægidia, n. s.

♂ ♀, 23—32 mm. Head, palpi, antennæ, and thorax light grey; antennæ in male quite naked. Abdomen grey-whitish. Legs grey. Fore wings elongate, suboblong, costa rather strongly arched, apex round-pointed, hind margin rather strongly oblique, almost straight; light grey, with a few fine scattered black scales; basal area somewhat mixed with light brown-reddish and black scales, especially in male; lines subdentate, blackish, somewhat mixed with light brown-reddish; first from two-fifths of costa to middle of inner margin, somewhat curved outwards, rather thick, towards inner margin slender; second from three-fourths of costa to three-fourths of inner margin, slender, moderately bent outwards above middle; some reddish scales towards hind margin, especially in male; cilia grey-whitish, somewhat mixed with reddish, with two dark grey lines. Hind wings pale grey, ochreous-tinged; cilia whitish-grey. Under surface of fore wings in male with disc wholly fulvous.

Mount Lofty, South Australia; two specimens taken by Mr. E. Guest.

PHYCITIDÆ.

CEROPREPES, *Z.*

The essential characters of the neuration (previously not quite correctly stated by me) are: Fore wings with veins 4 and 5 separate, 10 rising out of stalk of 8 and 9. Hind wings with veins 4 and 5 stalked from a point with 3. Although in the case of the following species the male is unknown, I have little doubt of its correct location.

Ceroprepes sebasmia, n. s.

♀, 24 mm. Head, palpi, antennæ, thorax, and legs blackish-grey, closely irrorated with whitish; palpi with scales of second joint forming a short triangular apical tuft beneath, terminal joint obtuse. Abdomen greyish-ochreous. Fore wings elongate, narrow at base, posteriorly moderately dilated, costa moderately arched, apex obtuse, hind margin somewhat obliquely rounded; dark grey, densely irrorated with whitish; veins obscurely blackish; first line indicated by a very fine irregular black line from one-third of costa obliquely outwards, in disc forming an angle and becoming obsolete; cilia grey irrorated with white. Hind wings pale greyish-ochreous, apex suffusedly fuscous; a cloudy fuscous hind-marginal line; cilia ochreous-whitish, with a cloudy fuscous line.

Quorn, South Australia; one specimen in October.

CONOBATHRA, *Meyr.*

Conobathra automorpha, Meyr.

Also from Queensland; one specimen (coll. *Lucas*).

CANTHELEA, *Walk.*

Forehead vertical. Ocelli present. Tongue well-developed. Antennæ three-fourths, in male stout, filiform, minutely ciliated (♂), slightly sinuate at base, sinuation with a streak of slightly rough scales above. Labial palpi moderate, arched, ascending, with loosely appressed scales, terminal joint shorter than second, tolerably pointed. Maxillary palpi moderate, loosely scaled. Abdomen in male with small anal tuft. Middle tibiæ smooth-scaled; posterior tibiæ with outer spurs half inner. Fore wings with veins 4 and 5 approximated at base, 7 absent, 8 and 9 stalked,

10 closely approximated to 9. Hind wings $1\frac{1}{2}$; veins 4 and 5 stalked from a point with 3, 7 out of 6 near origin, anastomosing with 8 to near middle.

Nearly approaching *Catastia* in structure; differing principally by the smooth middle tibiæ. The sinuation and roughening of the antennæ are much less apparent than in *Catastia*, and the palpi more ascending.

Canthelea ægnalis, Walk.

Pyralis ægnalis (*ægnusalis*), Walk., Pyr., 905; *Canthelea gratella*, ib., Cr., 26; Suppl., 1726.

♂ ♀, 16—19 mm. Head yellow-ochreous, mixed with ferruginous. Palpi yellow-ochreous, terminal joint and apex of second ferruginous in front. Antennæ yellow-ochreous, scale-streak dark fuscous. Thorax in male yellow-ochreous, shoulders reddish-ochreous; in female wholly reddish-ochreous. Abdomen whitish-ochreous. Legs whitish-ochreous, anterior pair carmine-tinged, more or less suffused with dark fuscous, middle pair with apex of tibiæ carmine, tarsi suffused with dark fuscous. Fore wings elongate, posteriorly gradually dilated, costa hardly arched, apex obtuse, hind margin rather obliquely rounded; ochreous-yellow; in female an ochreous-white costal streak, suffusedly margined beneath with dark grey mixed with crimson; markings dull crimson, somewhat mixed with grey, especially in female, where they are also more suffused; a thick upwards-curved streak from middle of base to inner margin at one-third; first line from two-fifths of costa to middle of inner margin, narrow, irregular, generally more or less interrupted; second line from four-fifths of costa to four-fifths of inner margin, irregular, above middle with a sharp indentation inwards sending a projection into disc, on which are often two transversely placed dark grey dots; a variable irregular hind-marginal fascia, suffusedly confluent with second line at both extremities; cilia pale whitish-ochreous, greyish-tinged, with two cloudy pale crimson lines. Hind wings pale whitish-ochreous; apex suffused with fuscous; a cloudy fuscous hind-marginal line; cilia ochreous-whitish, with a cloudy fuscous line.

Queensland; one specimen (coll. *Lucas*). Also from Ceylon. I have described the species from a series of Ceylon specimens.

Myelois, *Z.*

Myelois actiosella, Walk.

Aurana actiosella, Walk., 122.

♂, 17 mm. Head grey-whitish. Palpi fuscous, second joint with apex and two bands whitish. Antennæ, thorax, and abdomen grey. Legs dark fuscous ringed with white, posterior tibiæ whitish. Fore wings elongate, posteriorly dilated, costa almost straight, apex obtuse, hind margin rather oblique, straight, rounded beneath; white, with a few fine scattered fuscous scales; a fuscous basal fascia, its outer edge running from near base of costa to one-fourth of inner margin; a slender obscure fuscous streak along basal half of costa; first line thick, dark fuscous, becoming lighter beneath, from one-fourth of costa to one-third of inner margin, anterior edge concave, posteriorly connected beneath with second line by a fuscous oblong patch covering dorsal half of median area; two black dots tranversely placed in disc above middle; a thick dark fuscous streak from apex of costa to posterior angle of dorsal fuscous patch, intersected by second line, which is whitish, margined anteriorly with dark fuscous and posteriorly with light fuscous, running from four-fifths of costa to inner margin before anal angle, somewhat sinuate; an interrupted blackish hind-marginal line; cilia light fuscous, becoming white towards apex. Hind wings grey, semitransparent; a cloudy dark grey hind-marginal line; cilia whitish, with a grey line.

Queensland; one specimen (coll. *Lucas*). Also from Ceylon.

Euzophera, *Z.*

Euzophera subarcuella, Meyr.

This species is correctly referable here, and it was by error that I removed it to *Cateremna*. The fore wings in the male have a long tuft of hairs beneath the costa, rising from the base; a peculiar character, but I regard it as merely specific.

Also from Glen Innes and Sydney, New South Wales; Melbourne, Victoria; Mount Lofty and Ardrossan, South Australia.

Euzophera holophragma, n. s.

♀, 14 mm. Head grey mixed with white. Palpi white with a few dark grey scales, terminal joint and apex of second blackish-grey, terminal joint short. Antennæ grey-whitish. Thorax grey,

irrorated with white and obscurely spotted with blackish. Abdomen pale ochreous-grey. Legs blackish, partially irrorated with white, apex of joints white. Fore wings elongate, moderately dilated, costa hardly arched, apex obtuse, hind margin obliquely rounded; light grey, with a few fine scattered black scales; a straight transverse darker shade formed by blackish irroration from one-fifth of costa to one-third of inner margin; an ill-defined downwards-curved white band, sprinkled with black scales, from costa beyond this shade, returning to costa before second line, enclosing a short cloudy blackish streak along median part of costa, and cut by a strong blackish bar before middle representing first line; a small blackish transverse discal spot beyond middle; second line from costa near apex to anal angle, whitish, very obscure except on costa, where it becomes white, margined anteriorly with blackish, indented above middle, followed on costa by a blackish suffusion; cilia grey, irrorated with white. Hind wings light fuscous-grey, darker towards apex; a darker hind-marginal line; cilia grey-whitish.

Carnarvon, West Australia; one specimen in October. Nearly allied to *E. subarcuella*, but readily separated by the strong blackish bar cutting the subcostal band of fore wings, and by the substitution of black for the characteristic purple scales strewn on this band.

Eucarphia, *IIb.*

Eucarphia tritalis, Walk.

Also from Duaringa and Toowoomba, Queensland; Glen Innes, Orange, and Cooma, New South Wales; Albany, Geraldton, and Perth, West Australia.

Tetralopha, *Z.*

Forehead vertical. Ocelli present. Tongue well-developed. Antennæ two-thirds, in male dentate, dentations terminating in tufts of long cilia (2), towards apex filiform, pubescent. Labial palpi moderately long, recurved, with appressed scales, terminal joint short, cylindrical. Maxillary palpi in male terminating in a long single or double pencil of fine hairs. Abdomen in male with small anal tuft. Fore wings with veins 4 and 5 from a point, 7 absent, 8 and 9 stalked. Hinds wings $1\frac{2}{3}$; vein 3 closely approximated to 4 at base, 4 and 5 stalked, 7 out of 6 near origin, anastomosing with 8 to near middle.

Tetralopha piratis, n. s.

♂, 28 mm. Head, palpi, thorax, and anterior legs white sprinkled with fuscous; tuft of maxillary palpi yellow-whitish. Antennæ grey-whitish. Abdomen white, segments suffused with dark fuscous towards base. (Middle and posterior legs broken.) Fore wings elongate, posteriorly strongly dilated, costa bent beyond middle, apex obtuse, hind margin somewhat oblique, straight, rounded beneath; white, irrorated with fuscous and dark fuscous; basal third wholly fuscous except towards costa, bounded by first line; a strong black line from one-third of costa to two-fifths of inner margin, forming a tuft of raised scales in disc; first line from two-fifths of costa to middle of inner margin, clear white, margined with black on both sides but less completely posteriorly, somewhat sinuate irregularly below middle; a transverse curved fine linear dark fuscous mark in disc beyond middle; second line white, ill-defined, obscurely fuscous-margined, from near before apex to near before anal angle, angularly indented beneath costa; veins posteriorly obscurely dark fuscous, interrupted on second line; a dark fuscous interrupted hind-marginal line; cilia white mixed with fuscous, with an obscure fuscous line. Hind wings grey-whitish, semitransparent; costa posteriorly and hind margin very narrowly grey; a dark grey hind-marginal line; cilia whitish, with a grey line.

Queensland; one specimen (coll. *Lucas*).

Etiella, *Z.*

Etiella chrysoporella, Meyr.

Also from Duaringa and Toowoomba, Queensland; Bathurst, New South Wales; Geraldton and Carnarvon, West Australia.

Etiella Behrii, Z.

Also from Brisbane, Queensland; Glen Innes, Bathurst, and Cooma, New South Wales; Perth, West Australia.

Epicrocis, *Z.*

I consider this generic name is to be used for the genus now generally known as *Salebria*, Hein. The name *Salebria* was first used by Zeller in 1846 for that section of *Pempelia* characterised by scale-tufts on surface of wings; afterwards Heinemann described as *Salebria*

of Zeller a genus distinguished from true *Pempelia* by the presence of vein 5 in the hind wings, but this is not Zeller's group. Zeller did not employ the name after 1847, considering the section untenable. In 1848 Zeller founded the genus *Epicrocis* on a single species, *E. festivella*; this species does not, in my judgment, differ generically from the species of Heinemann's genus *Salebria*, and the characters are given correctly and in full; I therefore have no hesitation in adopting it. This (with some other exotic genera described at the same time) does not seem ever to have been re-examined by Zeller in later years, or he would probably have noticed this identity.

Epicrocis eucometis, Meyr.

Salebria squamicornis, Butl., Trans. Ent. Soc. Lond., 1886, 439, is a synonym of this.

Epicrocis gypsopa, Meyr.

Also from Albany, York, Perth, and Carnarvon, West Australia.

Epicrocis macrota, n. s.

♂ ♀, 18–22 mm. Head, palpi, and thorax grey, thinly irrorated with blackish; palpi in female very long, porrected; maxillary palpi of male ochreous-yellow. Antennæ grey, basal joint and tuft black, tuft large. Abdomen pale whitish-ochreous, greyish-tinged. Legs grey-whitish irrorated with black, tibiæ with subapical black bands, anterior tarsi blackish. Fore wings elongate, very narrow, posteriorly somewhat dilated, costa posteriorly gently arched, apex obtuse, hind margin rather obliquely rounded; grey, towards costa and hind margin with fine scattered black scales; basal third crossed by six fine longitudinal black lines; inner margin mixed with pale reddish-ochreous; an ill-defined white spot on inner margin at one-fourth, sometimes obsolete; first line slender, whitish, posteriorly black-margined, somewhat irregular, from two-fifths of costa to middle of inner margin, somewhat angulated in middle; a pale reddish-ochreous suffusion, mixed with white, towards middle of disc; a small black discal spot at two-thirds, beneath which is a roundish patch irrorated with black; second line slender, whitish, blackish-margined, from five-sixths of costa to before anal angle, angulated obtusely inwards at one-fourth, outwards in middle, and somewhat sinuate inwards near inner margin; a black hind-marginal line; cilia grey, with rows of white

and black points. Hind wings thinly scaled, ochreous-grey-whitish, apex and upper part of hind margin narrowly greyish; cilia ochreous-whitish.

Carnarvon, West Australia; six specimens in October, principally on *Eucalyptus* blossom after dark. Immediately recognisable by the extremely narrow fore wings; nearest allied to *E. gypsopa*.

Epicrocis mesembrina, n. s.

♂, 21 mm. Head, palpi, antennæ, thorax, and legs dark grey sprinkled with whitish. Abdomen dark grey, margins of segments broadly whitish-yellow. Fore wings elongate, narrow at base, moderately dilated, costa slightly arched, apex obtuse, hind margin rather oblique, rounded beneath; dark grey, closely irrorated with white; inner margin irregularly blackish towards base, forming a small spot before first line; first line from one-third of costa to two-fifths of inner margin, irregular, white, on upper half obsolete, posteriorly sharply black-margined throughout, the margin forming a small spot on costa; a dark fuscous erect cloudy spot from inner margin beyond middle, reaching half across wing; a blackish transverse-linear discal dot; second line indicated by dark fuscous margins, from four-fifths of costa to four-fifths of inner margin, rather irregular, indented inwards beneath costa, posterior margin suffusedly dilated towards apex; a dark fuscous hind-marginal line; cilia dark grey, with rows of whitish points. Hind wings ochreous-yellow; a narrow dark fuscous hind-marginal border, uniting at apex with a somewhat broader costal border; cilia grey, with a darker basal line.

Albany, West Australia; one specimen (Australian Museum).

Epicrocis festivella, Z.

Epicrocis festivella, Z., Is., 1848, 878; ib., Caff., 77; *Pyralis ratoalis*, Walk., 916; *Scopula albigeralis*, ib., Suppl., 1468.

Queensland; one specimen (coll. *Lucas*). Also from Java, Ceylon, and South Africa.

Epicrocis euraphella, Meyr.

Although the male is still unknown, I conjecture that the species should be placed in this genus rather than in *Hypophana*, because of its evident relationship to *E. macrota*.

Pempelia, *IIb.*

The following species agrees with this genus so far as the structure of the female permits a conclusion to be formed; but it is of peculiar facies, and may prove on discovery of the male to be a distinct genus.

Pempelia (*?*) *hemichlæna*, n. s.

♀, 18—21 mm. Head and thorax whitish, suffusedly spotted with pale ochreous. Palpi pale ochreous, second joint with three whitish bands, third apical. Antennæ grey. Abdomen whitish-ochreous. Legs whitish-ochreous, tarsi suffused with grey. Fore wings elongate, posteriorly dilated, costa bent beyond middle, apex obtuse, hind margin somewhat oblique, straight, rounded beneath; fuscous; basal half whitish-ochreous, bounded by a sinuate line from middle of costa to middle of inner margin, bordered on lower half by a white streak margined anteriorly with reddish and posteriorly with blackish; a central longitudinal reddish streak from base of wing to apex of white streak, having beneath its middle a large tuft of reddish scales mixed with blackish, and margined above by a grey suffusion which extends to costa at one-fourth; a tuft of raised scales near inner margin beyond white streak; a whitish-ochreous black-margined crescentic mark in disc beyond middle; a very faintly indicated grey-whitish subterminal line, sinuate and dilated on costa; some reddish scales towards apex; a black hind-marginal line, tending to form spots; cilia grey, with rows of whitish points, base whitish. Hind wings with veins 3 and 4 from near together; light grey, more or less suffused with pale whitish-yellowish towards base; a grey hind-marginal line; cilia whitish, with a cloudy grey line.

Victoria; two specimens (coll. *Lucas*).

Tylochares, *Meyr.*

The location of the following species must also be regarded as merely provisional, in the absence of the male. Superficially it is very distinct from any other Australian species.

Tylochares (*?*) *ianthemis*, n. s.

♀, 16 mm. Head, palpi, antennæ, thorax, and abdomen whitish-ochreous; terminal joint of labial palpi moderate, tolerably pointed; maxillary palpi short, loosely scaled, appressed to face.

Legs ochreous-whitish. Fore wings elongate, posteriorly somewhat dilated, costa posteriorly gently arched, apex obtuse, hind margin oblique, hardly rounded; whitish-ochreous, faintly tinged with reddish-ochreous; basal and terminal areas mixed with light ochreous-reddish, forming a suffusion towards margin of lines; basal area suffusedly mixed with grey towards margins; lines white, somewhat irregular, tolerably defined; first from two-fifths of costa to middle of inner margin, hardly curved; second from four-fifths of costa to before anal angle, straight, faintly sinuate above middle; median area irregularly mixed with grey; a faint whitish discal spot, beneath which is a small cloudy dark grey spot; a dark grey spot on costa beyond second line, connected with a dark grey hind-marginal line; cilia with basal half ochreous-white, terminal half light grey. Hind wings semitransparent, pale grey; a suffused dark grey hind-marginal line; cilia whitish, with a dark grey line.

LASIOSTICHA, n. g.

I propose this name in place of *Lasiocera*, Meyr., preoccupied in the Coleoptera.

Lasiosticha antelia, Meyr.

Also from Victoria (coll. *Lucas*); two females, with the fore wings suffused with whitish towards costa, but otherwise quite similar.

HEOSPHORA, *Meyr.*

Heosphora psamathella, Meyr.

Also from Brisbane, Queensland; Fernshaw, Victoria. *Anerastia nitens*, Butl., Trans. Ent. Soc. Lond., 1886, 440, is a synonym of this.

ANERASTIA, *Hb.*

So far as my knowledge of the species of the *Anerastia* group extends, I should be disposed at present to refer them all to a single genus *Anerastia*, characterised by the peculiar and apparently constant neuration (as described below), the obsolescence of the maxillary palpi, and the very short or rudimentary tongue; regarding the variation in the character of the labial palpi, the presence or absence of a horny frontal cone, and of a basal sinuation and small scale-streak or tuft in the

antennæ of the male, as merely specific points; these latter appear to me to differ more or less in every species. If this view is correct the preceding genus, *Heosphora*, would also be merged in this. I do not press my view at present, because I believe M. Ragonot, who has had the opportunity of examining much more extensive material, thinks differently, and it seems desirable to await the publication of his opinions before making further change. I have therefore described the following species as an *Anerastia*, but indicated in the specific description the structural points in which it diverges from other forms.

The special points of neuration, by which *Anerastia* (including *Heosphora*) is characterised, are the absence of vein 5 of the fore wings (which is coincident with 4), and the free vein 8 of the hind wings, which is approximated to 7 but does not anastomose with it, as usual in the family. This latter point I regard as most important here; it seems to have been hardly noticed. The ocelli appear to be always present, but sometimes more or less concealed; I mention this because Heinemann states that they are absent.

Anerastia metallactis, n. s.

♂, 20—21 mm. Head, palpi, antennæ, thorax, and abdomen whitish-ochreous, slightly brownish-tinged; frontal cone long, obtuse-conical; tongue present, very small; antennæ without basal sinuation or roughening, filiform, ciliations one-half; labial palpi very long, straight, porrected; maxillary palpi obsolete. Legs dark fuscous, posterior pair ochreous-whitish. Fore wings elongate, moderate, posteriorly scarcely dilated, costa gently arched, apex rounded, hind margin obliquely rounded; pale brownish-ochreous, slightly reddish-tinged; costal edge ochreous-white; all veins rather broadly ochreous-whitish mixed with fuscous-grey; except subcostal, which forms a clear ochreous-white straight narrow streak from base to costa before apex, below narrowly and suffusedly margined with dark grey; cilia grey-whitish. Hind wings semitransparent, pale whitish-grey; cilia whitish.

Bathurst, New South Wales; three specimens taken by Mrs. Stephenson.

Crocydopora, *Meyr.*

Crocydopora cinigerella, Walk.

Also from Duaringa, Queensland; Glen Innes, Bathurst, and Cooma, New South Wales; Fernshaw, Victoria; and in New Zealand.

Ernophthora, n. g.

Forehead vertical. Ocelli present. Tongue well-developed. Antennæ three-fourths, in male subdentate, moderately ciliated, not sinuate, with a small tuft of scales on back at base. Labial palpi moderately long, curved, ascending, second joint with loosely appressed scales, terminal joint short, filiform, slender, pointed. Maxillary palpi rather short, filiform. Abdomen in male with small anal tuft. Posterior tibiæ with outer spurs half inner. Fore wings with vein 2 from close before angle, 3 and 4 stalked, 5 absent, transverse vein obsolete, 7 absent, 10 rising out of stalk of 8 and 9, 11 closely approximated to it at base. Hind wings 1¼; vein 4 absent, 5 absent, transverse vein absent, 6 and 7 both rising out of 8 at one-third and two-thirds respectively.

Allied to *Hypophana*, but with remarkable neuration; no other genus of the family has both veins 4 and 5 of the hind wings absent.

Ernophthora phœnicias, n. s.

♂, 15 mm. Head, palpi, thorax, and abdomen dark fuscous-grey, somewhat mixed with whitish. Antennæ grey. Legs white, irrorated with fuscous-crimson, and banded with dark fuscous. Fore wings elongate, narrow, tolerably dilated posteriorly, costa slightly arched, apex tolerably rectangular, hind margin rather oblique, straight, rounded beneath; white, irregularly irrorated with fuscous-crimson; a fuscous basal fascia mixed with blackish, outer edge from near base of costa to one-third of inner margin; a moderately broad fuscous fascia, mixed with black on upper half, from one-third of costa to middle of inner margin, somewhat dilated and indistinct beneath, confluent posteriorly with a cloudy fuscous suffusion along inner margin to anal angle; a small roundish blackish spot beneath middle of costa, and a blackish dot beneath it; second line whitish, margined with cloudy fuscous lines spotted with longitudinal blackish marks, from costa near apex to before anal angle, indented beneath costa, indentation connected with dorsal suffusion by a cloudy fuscous

streak, a cloudy blackish interrupted hind-marginal line; cilia whitish, mixed with fuscous (imperfect). Hind wings semi-transparent, light grey; veins and a cloudy hind-marginal line darker grey; cilia grey-whitish, with a cloudy grey line.

Queensland; one specimen (coll. *Lucas*).

Hypophana, *Meyr.*

Hypophana homosema, n. s.

♂ ♀, 16—19 mm. Head, palpi, antennæ, and thorax whitish-grey, somewhat prismatic; tuft of antennæ in male grey in front, black behind, ciliations one-third; thorax in male beneath with cuirass of shining pearly-white scales, concealing a large tuft of black hairs on each side. Abdomen grey-whitish. Legs ochreous-white irrorated with dark grey. Fore wings elongate, narrow, posteriorly somewhat dilated, costa gently arched, apex rounded, hind margin obliquely rounded; veins 4 and 5 stalked; grey, closely irrorated with white, more suffusedly towards costa, and with scattered black scales tending to collect on veins; a thick ill-defined whitish-ochreous longitudinal streak along submedian fold from base to anal angle, and another near inner margin from base to two-thirds, both often partially obsolete or interrupted posteriorly; an irroration of black scales tending to form a dot below fold at one-third, a second in disc before middle, a third in disc at two-thirds, and two curved shades near hind margin representing margins of second line, but these are all very obscure and often not traceable; cilia grey irrorated with white. Hind wings with veins 3 and 4 from a point, 5 absent; nearly transparent, whitish-grey; a cloudy grey hind-marginal line; cilia whitish, with a grey basal line.

Perth, York, Geraldton, and Carnarvon, West Australia; very common, in October and November. Nearly allied to *H. petalocosma*, but without the characteristic black scale-streak at base of hind wings in male.

Balanomis, n. g.

Forehead somewhat prominent. Ocelli present. Tongue well-developed. Antennæ three-fourths (in male broken). Labial palpi moderate, curved, ascending, thickened throughout with dense somewhat rough scales, terminal joint somewhat shorter than second, tolerably pointed. Maxillary palpi short, loosely scaled, appressed to face. Middle and posterior tibiæ thickened with dense scales. Fore wings in male towards base with costal fold

filled with downy matter; vein 2 from near angle, 4 and 5 stalked, 6 rising out of stalk of 8 and 9 almost at base, 7 absent, 11 from middle of cell. Hind wings $1\frac{2}{3}$; cell extremely short, veins 4 and 5 from a point, 7 rising out of 6 about middle of wing, anastomosing rather shortly with 8.

Balanomis encyclia, n. s.

♂ ♀, 20 mm. Head, palpi, and antennæ whitish-ochreous; thorax, abdomen, and legs light brownish-ochreous. Fore wings very elongate, narrow, somewhat dilated, costa posteriorly arched, apex rounded, hind margin obliquely rounded; brownish-ochreous, sprinkled with reddish, white, and dark fuscous scales; a large ocellated patch indicated about two-thirds, consisting of a cloudy whitish centre, surrounded successively by blackish, ochreous, and whitish rings, all very indistinct except on anterior margin; a very indistinct pale angulated line beyond this; cilia pale ochreous, base more reddish, tips whitish. Hind wings semitransparent, grey-whitish, hind margin greyer; cilia whitish.

Newcastle, New South Wales; two specimens, in bad preservation (Australian Museum).

Homœosoma, *Curt.*

Homœosoma vagella, Z.

Also from Glen Innes (4500 feet), Bathurst, and Cooma, New South Wales; Geraldton and Carnarvon, West Australia.

Homœosoma fornacella, Meyr.

Also from Georges Bay, Tasmania.

Ephestia, *Gn.*

Ephestia elutella, Hb.

Also from Cooma, New South Wales; Perth and Geraldton, West Australia.

Ephestia desuetella, Walk.

I have pointed out elsewhere that this name is to be substituted for *E. ficulella*, Barrett. Also from Carnarvon, West Australia.

PTEROPHORIDÆ.

Cosmoclostis, *Meyr.*

Cosmoclostis aglaodesma, Meyr.

The British Museum has received this also from the Solomon Islands.

Trichoptilus, *Wlsm.*

Trichoptilus centetes, Meyr.

Also from Queensland; one specimen (coll. *Lucas*).

Trichoptilus adelphodes, n. s.

♂ ♀, 14—16 mm. Head ochreous. Palpi ochreous mixed with white and fuscous, base white, second joint reaching middle of face. Antennæ ochreous-whitish, with a dark fuscous line on back. Thorax ochreous, posterior margin more or less white. Abdomen ochreous mixed with ochreous-whitish, sides generally mixed with dark fuscous, apex in male with a single moderate obliquely ascending hair-pencil, valves small. Legs white, longitudinally striped with blackish, posterior tibiæ banded in middle and at apex with brownish-ochreous or dark fuscous. Fore wings cleft from middle, segments linear; veins 2 and 10 present; brownish-ochreous; costal edge and first segment more or less suffused with fuscous; a black dot in disc at one-third, and another on first segment at base; generally a few white scales before cleft; some white scales forming obscure bands on both segments before middle and towards apex; cilia rather dark fuscous, or ochreous-fuscous, on costa spotted with white on bands, on lower margin of first segment mixed with white, with one or two black scales, on upper margin of second segment with some white scales towards base, some black scales towards middle, and a white apical spot, on lower margin of second segment with narrow white bars opposite bands. Hind wings cleft firstly from one-fourth, secondly from base, segments linear; rather dark fuscous; cilia light fuscous, third segment at most with one or two black scales on inner margin at three-fifths, and a fringe of white hair-scales between this and base.

Carnarvon, West Australia; six specimens in October. The species was rather common, appearing to frequent a species of vetch, but at the time I mistook it for *T. xerodes*. It is much more nearly allied to *T. centetes*, differing at first sight principally in the more pronounced

whitish bands of the fore wings; but the characters on which I should rely for its distinction are the absence of the subcostal black dot near base, the single apical hair-pencil of the abdomen in male, and the possession of only one or two black scales in place of the decided spot of *T. centetes*. It agrees with *T. centetes*, and differs from any of the other Australian species in the presence of vein 10 of the fore wings, and of the black dot on the base of first segment.

Trichoptilus xerodes, Meyr.

Also from York, West Australia.

TETRASCHALIS, n. g.

Forehead without tuft. Antennæ minutely ciliated (♂). Palpi moderately long, ascending, with appressed scales, terminal joint long, filiform. Tibiæ tufted with scales on origin of spurs. Fore wings bifid, cleft from middle; veins 2 and 4 stalked, 3 absent, 5 and 6 very short, 7 from below angle of cell, long, 9, 10, and 11 out of 8. Hind wings trifid, third segment with tuft of black scales in dorsal cilia; vein 2 from middle of cell, 3 absent, 5 and 6 very short, 7 to apex.

Allied to *Oxyptilus*, but distinguished by having vein 11 of the fore wings rising out of the stalk of 8, 9, and 10.

Tetraschalis arachnodes, n. s.

♂, 21—24 mm. Head, palpi, thorax, and abdomen light brownish-ochreous, mixed with whitish, reddish, and dark fuscous scales. Antennæ whitish. Legs very slender, whitish, irrorated with reddish-fuscous, anterior and middle pair tending to be longitudinally striped. Fore wings with segments linear, first slightly, second posteriorly moderately dilated, pointed; reddish-fuscous, sprinkled with whitish and irrorated with dark fuscous; a cloudy narrow white band on base of first segment, a broader one at its middle, and a narrow one at three-fourths, two latter also indicated on second segment; cilia grey, irregularly mixed throughout with black scales. Hind wings cleft firstly from one-fourth, secondly from near base, segments linear; fuscous, third segment dark reddish-fuscous; cilia grey, third segment with a few black scales on upper margin, on lower margin with a tolerably continuous row of close black scales from near base to apex and a fringe of white

hair-scales, a large triangular tooth of black scales beyond middle and another at apex.

Newcastle, New South Wales; two specimens, in indifferent condition (Australian Museum).

Sphenarches, *Meyr.*

Sphenarches caffer, Z.

Oxyptilus caffer, Z., Linn. Ent., vi., 348, Caff., 118; *O. anisodactylus*, Walk., 934; *O. Walkeri*, Wlsm., Trans. Ent. Soc. Lond., 1881, 279; *Sphenarches synophrys*, Meyr., Trans. Ent. Soc. Lond., 1886, 17.

Also from Sydney, New South Wales; one specimen in February. I am indebted to the kindness of Lord Walsingham for calling my attention to the above synonymic identification, in which, after examination of his specimens, I fully agree. The range of the species therefore extends from South and West Africa through Ceylon to Australia and the South Pacific Islands.

Mimeseoptilus, *Wallgr.*

Mimeseoptilus celidotus, Meyr.

Also from Albany, West Australia.

XIII. *Descriptions of some exotic* Micro-Lepidoptera.

By E. Meyrick, B.A., F.E.S.

[Read June 1st, 1887.]

In this paper I have described a few new genera and species which seemed to me to have individual characteristics that rendered them worth making known, from a systematic point of view; with one or two others as to which there has been some specific confusion.

HYDROCAMPIDÆ.

Mixophyla, n. g.

Forehead vertical. Ocelli present. Tongue well-developed. Antennæ $\frac{3}{4}$, in male—?. Labial palpi moderately long, slender, smooth-scaled, recurved, terminal joint two-thirds of second, acute. Maxillary palpi moderate, slender, porrected, apex penicillate. Posterior tibiæ with all spurs long and almost equal. Fore wings with veins 4 and 5 somewhat approximated at base, 8 and 9 stalked, 10 absent, 11 from near 9. Hind wings as broad as fore wings; veins 4 and 5 approximated at base, 6 rising from near 7, 7 from angle of cell, anastomosing with 8 from near origin to before middle, lower median loosely pectinated towards base.

A most singular genus, very distinct from any known to me. It must, I think, be regarded as an early developmental type in this family, showing some affinity with the *Musotimidæ* and *Crambidæ*. It will hardly be credited that this insect, with labial palpi like those of an *Œcophora* (to say nothing of the peculiar neuration), is described by Mr. Moore without remark as a typical *Crambus*, presumably solely on the ground of the similar type of marking.

Mixophyla erminea, Moore.

Crambus ermineus, Moore, Lep. Ceyl. iii., 380, pl. clxxxiv., 7.

♀, 11 mm. Head, palpi, thorax, abdomen, and legs snow-

white; anterior legs dark fuscous above. Antennæ grey. Fore wings rather elongate-triangular, costa slightly arched, apex obtuse, hind margin hardly oblique, faintly sinuate below apex, rounded beneath; snow-white; two fine grey transverse lines; first from beyond middle of costa to beyond middle of inner margin, unevenly curved outwards, forming a dark grey spot on inner margin; second from before three-fourths of costa to inner margin before anal angle, obtusely angulated somewhat above middle, lower half slightly sinuate; a series of seven irregular elongate ochreous-yellow marks near beyond second line, four lowest hind marginal, fifth and sixth confluent, with a round black submarginal dot between them; a black line along upper third of hind margin; cilia snow-white, terminal half metallic-grey, except round anal angle. Hind wings whitish, suffused with pale grey posteriorly; cilia snow-white.

Colombo, Ceylon; one specimen in December.

Microschœnis, n. g.

Forehead vertical, with a conical projection of scales. Ocelli present. Tongue rudimentary. Antennæ $\frac{2}{3}$, in male subdentate, moderately ciliated ($\frac{1}{3}$). Labial palpi very long, straight, porrected, loosely rough-scaled above and beneath, gradually attenuated to apex. Maxillary palpi short, thick, porrected, loosely scaled. Abdomen in male with uncus developed, prensors moderate, exserted. Posterior tibiæ with outer spurs about half inner. Fore wings with vein 2 from two-thirds of cell, 4 and 5 approximated at base, 8 and 9 stalked, 11 running into 12. Hind wings narrower than fore wings; veins 4 and 5 approximated at base, 7 from a point with 6, anastomosing with 8 to near middle, lower median naked.

Closely allied to *Schœnobius*, but the species is much smaller and more crambideous-looking; distinguished from it by vein 11 of the fore wings running into 12; and it is to be noted that this character is of frequent occurrence in the *Crambidæ*, but very unusual in any other family of the *Pyralidina*.

Microschœnis immeritalis, Walk.

Dosara immeritalis, Walk. Pyr., 830; *Araxes decursella*, ib., Cr., 194.

♂, 11—12 mm. Head, palpi, antennæ, thorax, abdomen, and legs whitish-ochreous; anterior legs fuscous above. Fore wings

elongate-triangular, costa slightly arched, apex obtuse, hind margin somewhat obliquely rounded; whitish-ochreous, towards margins more yellowish-tinged; cilia whitish-ochreous, yellowish-tinged. Hind wings oblong-ovate, very pale whitish-ochreous; cilia whitish-ochreous.

Point de Galle, Ceylon; two specimens in November. Walker's genus *Dosara* is a synonym of *Eurycreon*, and his genus *Araxes* a synonym of *Crambus*.

BOTYDIDÆ.

Margarodes, *Gn.*

Margarodes nereis, n. s.

♀, 52—54 mm. Head greenish-white, lower angles of face triangularly deep ferruginous, meeting on lower margin. Labial palpi deep ferruginous, lower half white. Maxillary palpi wholly deep ferruginous. Antennæ white above, yellow-ochreous beneath. Thorax very pale whitish-greenish, shoulders bright ferruginous. Abdomen greenish-whitish, apex light ochreous. Legs greenish-whitish, anterior pair with tibiæ and apex of femora, middle pair with tibiæ, except towards apex, ferruginous. Fore wings elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin oblique, slightly bowed; pale ochreous-greenish, irrorated with green-whitish, especially on veins posteriorly, with prismatic reflections; a moderate ferruginous costal streak, beyond middle becoming rapidly paler, beyond two-thirds reduced to a slender line along costal edge, bordered beneath throughout by a moderate suffused white streak, becoming less defined and more greenish-white posteriorly; a blackish transverse-linear discal dot; a hind marginal series of black dots between veins; cilia with basal half green-whitish, terminal half light shining silvery-grey. Hind wings with colour as in fore wings, but somewhat obscured by numerous whitish hairs, becoming denser towards base; hind marginal dots as in fore wings, but more elongate transversely; cilia as in fore wings.

This species is described by Walker and Moore as *M. glauculalis*, Gn., which it certainly is not, if Guenée's description is correct, which there is no reason to doubt. This species is closely allied to *M. tritonias*, Meyr., and *M. oceanitis*, Meyr., but quite distinct.

Kandy, Ceylon; two specimens. The British Museum has a series.

SCOPARIADÆ.

SCOPARIA, *Hw.*

Scoparia chordactis, n. s.

♂, 23 mm. Head whitish, behind eyes fuscous. Labial palpi 2, grey-whitish, terminal joint concealed in scales of second. Maxillary palpi dark fuscous, apex broadly whitish. Antennæ grey, joints somewhat incised, ciliations ½. Thorax light fuscous, mixed with grey-whitish on back. (Abdomen broken.) Legs whitish, anterior pair fuscous. Fore wings elongate, posteriorly gradually somewhat dilated, costa almost straight, apex obtuse, hind margin rather oblique, rounded beneath; pale ochreous-brownish, irregularly suffused with white, except on a cloudy median longitudinal streak from base to hind margin, becoming well-defined posteriorly; a fine black median longitudinal line from base to two-fifths; orbicular represented by a short black longitudinal line, claviform by a shorter blackish mark; reniform barely perceptible as an 8-shaped outline, its middle marked with a cloudy blackish dot; veins posteriorly marked here and there with blackish, especially on median streak; cilia pale greyish-ochreous, basal half obscurely barred with white. Hind wings 1½, pale whitish-grey, thinly scaled; cilia white.

Straits of Magellan; one specimen, received from Mr. J. J. Walker, R.N. Interesting because approaching nearest in character to some of the larger New Zealand species; perhaps most allied to *S. panopla*, but that species is much more strongly marked.

CRAMBIDÆ.

CRAMBUS, *F.*

Crambus signifer, Walk.

Thiallela signifera, Walk., 120; *Araxes admigratella*, ib., 192; *A. cæsella*, ib., 193; *Crambus troglodytellus*, Snell. T. v. E., 1872, 103, pl. viii., 6.

♂, 12—15 mm. Head and thorax ochreous-white, sometimes somewhat irrorated with pale ochreous or fuscous. Labial palpi 3, white, with obscure dark fuscous bars before and beyond middle. Maxillary palpi white. Antennæ pale greyish-ochreous, ciliations ¼. Abdomen pale whitish-ochreous, greyish-tinged. Legs white, anterior pair and base of tarsal joints fuscous

above, posterior tibiæ with outer spurs nearly equal inner. Fore wings elongate, posteriorly rather strongly dilated, costa almost straight, apex obtuse, hind margin rather oblique, rounded beneath; veins 4 and 5 stalked, 9 absent (coincident with 8); pale brownish-ochreous, more or less irrorated with fuscous and ochreous-whitish, on posterior half very closely; two fine white transverse lines, sometimes partially obsolete, except margins; first from beyond middle of costa to beyond middle of inner margin, irregular, incompletely margined with dark fuscous, upper half sharply curved or angulated outwards, lower half very strongly curved inwards, sometimes preceded on upper half by a strong fuscous suffusion; second from three-fourths of costa to inner margin before anal angle, acutely dentate, anteriorly finely margined with dark fuscous, moderately curved outwards; a cloudy more or less distinct white streak from apex of wing to first line below middle; a fine black hind-marginal line; cilia ochreous-grey irrorated with white; basal half in Ceylon specimens clear white, with a median spot and one or two bars on upper part of hind margin light greyish-ochreous; in Mauritius specimens with several narrow white bars only. Hind wings with veins 4 and 5 stalked; grey-whitish, semitransparent, posteriorly becoming greyer; a grey hind-marginal line; cilia white, with a faint greyish line.

St. Denis, Réunion, and Port Louis, Mauritius, in April and May; Kandy, Ceylon, in January; also from Borneo and West Africa; common and widely distributed. Nearest allied to *C. cunciferellus*. There can be no question of the specific identity of the slight geographical varieties noted above.

GELECHIADÆ.

Hypsolophus, *F.*

Hypsolophus ianthes, n. sp.

♀, 12 mm. Head and thorax pale ochreous, crown suffused with grey on top. Palpi dark grey, ochreous-tinged and finely irrorated with whitish-grey, terminal joint whitish-ochreous irrorated with grey, tuft of second joint long, oblong. Antennæ whitish-ochreous, finely annulated with dark grey. Abdomen grey. Legs whitish-ochreous, anterior and middle pair suffusedly irrorated with fuscous. Fore wings elongate, narrow, costa gently arched, apex pointed, hind margin extremely obliquely rounded; vein 3 absent (coincident with 2); ochreous; a minute obscure

dark fuscous dot in disc at two-fifths, and a cloudy dark fuscous dot in disc at three-fifths, beneath which is an obscure fuscous suffusion: some fuscous scales towards hind margin and apical part of costa, tending to form obscure marginal dots; cilia ochreous. Hind wings with apex round-pointed, hind margin moderately sinuate; veins 3 and 4 from a point, 6 and 7 short-stalked; light grey; cilia pale grey.

St. Denis, Réunion; one specimen in April. The neuration of this species gives me occasion to remark that, so far as my material enables me to judge, I do not think the genera *Hypsolophus* (*Ypsolophus*) and *Nothris* are naturally distinct, or ought to be kept separate. Heineman states several points of distinction —the absence of ocelli, the shorter tuft of the palpi, the constantly separate veins 2 and 3 of fore wings, and the stalking of veins 6 and 7 of hind wings—as characteristic of *Nothris*, but these seem to be illusory. The supposed absence of ocelli is a mistake; I find them distinct in the typical *verbascellus*, and in all species which I have examined; but this character in the *Gelechiadæ* is of little value. The length of the tuft is purely specific and varies with every species, being also a mere comparative difference. The two neural characters cut against one another, being found variously interchanged in nearly allied species; thus, in *H. fasciellus* 2 and 3 of fore wings are stalked, 6 and 7 of hind wings stalked (though placed by Heinemann in his *Ypsolophus*; perhaps the character varies); in *H. verbascellus* 2 and 3 separate, 6 and 7 stalked; in *H. ianthes* 2 and 3 coincident, 6 and 7 stalked; in an undescribed Australian species 2 and 3 coincident, 6 and 7 separate; in *H. marginellus* 2 and 3 separate, 6 and 7 separate; *H. ustulellus* 2 and 3 stalked, 6 and 7 separate: these represent all the possible combinations, and one might therefore as well make six genera as two. In my type of *H. lemniscellus* 6 and 7 are from a point, and therefore intermediate in character. The species being, as a whole, all very similar in appearance, their number certainly not excessively large, and the genus in the extended sense being strictly definable, natural, and easily recognisable, I think it may well remain undivided.

MACRERNIS, n. g.

Head smooth. Ocelli present. Tongue well-developed. Antennæ longer than fore wings; in male somewhat thickened above base, subserrate, simple, basal joint elongate, without pecten. Labial palpi (in male) with second joint moderate, subascending, terminating in a long dense triangular projecting tuft, terminal joint wholly concealed. Maxillary palpi very short, appressed to tongue. Posterior tibiæ clothed with dense rough hairs. Fore wings with vein 1 furcate, 2 from angle, 3 absent, 5 absent, 7 to hind margin, 8 and 9 rising out of 7, 11 from middle. Hind wings as broad as fore wings, trapezoidal, apex pointed, hind margin sinuate, cilia $\frac{1}{2}$; veins 3 and 4 very long-stalked, 5 from rather near 4, parallel, 6 and 7 stalked.

Nearly allied to *Crocanthes*, but with entirely different palpi, similar to those of *Anarsia*, male; the female is unknown, but perhaps also corresponds in structure of palpi to *Anarsia*. I do not think, however, that there is any close relationship with that genus.

Macrernis heliapta, n. s.

♂, 14 mm. Head, palpi, and thorax reddish-ochreous, palpi mixed with fuscous. Antennæ ochreous-yellow, towards base becoming dark fuscous above. Abdomen greyish-ochreous, apex ochreous-yellowish. Legs dark fuscous, posterior pair with apex of joints and hairs of posterior tibiæ ochreous-yellowish. Fore wings elongate, narrow, tolerably parallel-sided, costa gently arched, apex pointed, hind margin sinuate, rather oblique; reddish-ochreous, with scattered black scales, especially towards costa and inner margin; base of costa dark fuscous; a black dot in disc at one-third, and a second at two-thirds; a blackish apical dot; cilia light reddish-ochreous, with a few black points. Hind wings pale grey, posteriorly paler and tinged with whitish-ochreous; cilia pale whitish-ochreous, greyish-tinged, with a faint cloudy grey line.

Kandy, Ceylon; one specimen in December.

DEPRESSARIADÆ.

PHÆOSACES, *Meyr.*

Phæosaces tetraspilella, Walk.

Gelechia tetraspilella, Walk., 633.

♂, 14—15 mm. Head, palpi, antennæ, thorax, abdomen, and legs whitish-ochreous; ocelli visible; palpi with apex of basal

joint blackish, second joint very long, more brownish-ochreous, irrorated with blackish, terminal joint half second; anterior and middle legs suffused with dark fuscous, except apex of joints. Fore wings elongate, costa moderately arched, apex obtuse, hind margin obliquely rounded; whitish-ochreous, sometimes thinly irrorated with fuscous, with a few fine scattered black scales; costal edge blackish at base; a rather large black dot in disc at two-fifths, a second in disc beyond middle, and a third, smaller and sometimes nearly obsolete, on fold obliquely beyond first; a hind-marginal row of very indistinct cloudy minute dark fuscous dots; cilia whitish-ochreous, with some scattered fuscous and black points. Hind wings whitish-ochreous, irrorated with pale grey, towards base sometimes suffused with very pale grey; cilia whitish-ochreous, sometimes with a faint cloudy greyish line.

Kandy and Point de Galle, Ceylon; in December and January, three specimens. The generic identity of this insect with the New Zealand species of *Phæosaces* is interesting, as I am not aware of the genus occurring in Australia; the only structural points in which it differs from the New Zealand species are the presence of ocelli, to which I attach no importance, and the relatively shorter terminal joint of the palpi.

PLUTELLIDÆ.

Ancylometis, n. g.

Head smooth, side tufts tolerably appressed. Ocelli apparently absent. Tongue well-developed. Antennæ $\frac{1}{4}$, in male serrate, joints very short, minutely ciliated ($\frac{1}{3}$), basal joint moderate, without pecten. Labial palpi moderately long, recurved, second joint somewhat exceeding base of antennæ, thickened with dense appressed scales, terminal joint shorter than second, slender or somewhat thickened with appressed scales, acute. Maxillary palpi very short, appressed to tongue. Posterior tibiæ more or less densely clothed with rough hairs. Fore wings with vein 1 furcate, 2 from near angle, 7 absent (coincident with 8). Hind wings slightly narrower than fore wings, elongate-ovate, cilia $\frac{2}{3}$; in male with a thickened discal or marginal ridge; veins 3 and 4 from a point, 5 more or less closely approximated to 4 at base or absent, 6 and 7 parallel.

An early form of the family, and, I think, indicating some approach to the connection with the *Œcophoridæ*.

Sect. A. Hind wings with vein 5 present, ridge discal.

Ancylometis trigonodes, n. s.

♂, 11 mm. Head ochreous-yellow, face whitish-ochreous. Palpi light ochreous-yellow, terminal joint dark fuscous except apex, second joint somewhat rough above towards apex. Antennæ and thorax dark fuscous. Abdomen greyish-ochreous, segmental margins ochreous-whitish. Legs dark fuscous, apex of joints and posterior tibiæ whitish-ochreous. Fore wings elongate, rather narrow, costa moderately arched, apex obtuse, hind margin obliquely rounded; dark fuscous, very slightly purplish-tinged; a large ochreous-white triangular patch, mixed with pale yellow in middle, occupying median area, its base extending on costa from one-third to five-sixths, its apex narrowly truncate and resting on inner margin beyond middle, its posterior side with a short triangular projection below middle; a small dark fuscous spot on costa at two-thirds; a few yellow-whitish scales forming an obscure cloudy line from anal angle to posterior side of triangular patch near costa; cilia dark fuscous, basal half obscurely barred with whitish-grey-ochreous. Hind wings fuscous-grey, becoming much paler and semitransparent on basal half; a thickened dark fuscous ridge along lower margin of cell from near base to angle, its anterior extremity suffused with ochreous-whitish; cilia grey, becoming whitish-ochreous round anal angle and on inner margin.

Port Louis, Mauritius; one specimen, in May.

Ancylometis scæocosma, n. s.

♂, 11 mm. Head and palpi dark fuscous, terminal joint of palpi rather stout. Antennæ greyish-ochreous, suffusedly annulated with dark fuscous. Thorax and abdomen greyish-ochreous, suffusedly irrorated with dark fuscous. Legs dark fuscous, ringed with ochreous-whitish. Fore wings elongate, rather narrow, costa gently arched, apex obtuse, hind margin obliquely rounded; whitish-ochreous, irrorated with dark fuscous, tinged with yellowish round dark markings; costa suffused with dark fuscous; a small dark fuscous basal patch, its outer edge irregular and mixed with black; a large round blackish-fuscous dot in disc at one-third, and a second on fold slightly beyond it, connected by a fuscous suffusion; a third in disc at two-thirds, a fourth directly beneath it and connected with it by a pale yellow-ochreous spot, and a fifth on inner margin beneath this; hind margin broadly suffused with fuscous; cilia fuscous, mixed with whitish-ochreous (imperfect).

Hind wings grey, paler and semitransparent towards base; a grey thickened ridge along lower margin of cell from near base to angle, its anterior extremity suffused with whitish-ochreous; cilia grey-whitish, with a cloudy grey line.

St. Denis, Réunion; two specimens, in April.

Sect. B. Hind wings with vein 5 absent, ridge inner marginal.

Ancylometis astrapias, n. s.

♂, 12 mm. Head whitish-ochreous. Palpi whitish-ochreous, second joint externally fuscous, becoming dark fuscous towards apex, terminal joint slender, internally fuscous. Antennæ dark fuscous. Thorax whitish-ochreous, patagia fuscous. Abdomen light grey, anal tuft whitish-ochreous. Legs dark fuscous, posterior pair whitish-ochreous. Fore wings elongate, narrow, costa gently arched, apex obtuse, hind margin very obliquely rounded; fuscous, costa suffusedly darker; a pale greyish-ochreous median longitudinal streak from base, basal two-fifths straight, margined beneath by a blackish streak and above by a cloudy blackish dot at two-fifths, beyond this rather dislocated upwards and less defined, margined above by a cloudy blackish dot at two-thirds, thence bent abruptly upwards to costa before apex, anterior edge margined suffusedly with dark fuscous, posterior edge very suffused and ill-defined; cilia light greyish-ochreous, basal half obscurely barred with fuscous. Hind wings grey, towards base more thinly scaled; inner margin thickened to form a small ridge; cilia whitish-grey, towards base darker.

Port Louis, Mauritius; two specimens, in May.

TINEIDÆ.

Lasioctena, n. g.

Head with dense somewhat rough suberect hair-scales. Ocelli absent. Tongue absent. Antennæ somewhat over $\frac{1}{2}$; in male moderately bipectinated throughout, pectinations densely ciliated, basal joint moderate, densely scaled. Labial palpi moderate, slender, ascending, with appressed scales, at base with some rough hair-scales, terminal joint rather short, acute. Maxillary palpi absent. Thorax hairy beneath. Posterior tibiæ tolerably smooth-scaled, outer spurs half inner. Fore wings with vein 1 strongly furcate, all veins separate, 2 from angle, 7 to hind margin, 11

from middle, secondary cell well-defined. Hind wings broader than fore wings, oblong-ovate, cilia ½; 6 and 7 approximated at base, other veins separate and parallel.

Closely approaches *Melasina* in structure, but distinguished by the quite different character of the labial palpi.

Lasioctena sisyræa, n. s.

♂, 27—29 mm. Head and thorax grey, ochreous-tinged, mixed with white. Palpi white, above dark grey. Antennæ white, pectinations grey. Abdomen grey, segmental margins white. Anterior legs dark grey, middle and posterior legs grey irrorated with white. Fore wings elongate, costa gently arched, apex obtuse, hind margin very obliquely rounded; grey, ochreous-tinged, irregularly irrorated with white, the irroration tending to form a very suffused white streak from base of costa to hind margin below apex; markings fuscous mixed with black, ill-defined; a small elongate spot in disc before middle, a second, larger and subtriangular, on fold obliquely before it, a third on fold obliquely beyond it, and a fourth in disc at two-thirds; a more or less perceptible row of cloudy dots from five-sixths of costa to inner margin before anal angle; cilia ochreous-grey, mixed with white. Hind wings ochreous-grey; cilia whitish or ochreous-whitish, basal third ochreous-grey.

Grahamstown, South Africa; two specimens.

ELACHISTIDÆ.

BUTALIS, *Tr.*

Butalis chlorœma, n. s.

♂, 16 mm. Head, palpi, thorax, and abdomen whitish-ochreous; face brownish-tinged; palpi anteriorly suffused with dark fuscous, except towards base. Antennæ and legs dark fuscous (posterior legs broken). Fore wings elongate, rather narrow, long-pointed; veins 3 and 5 absent; whitish-ochreous, paler towards disc; a fuscous-grey dot in disc at two-thirds; cilia whitish-fuscous. Hind wings somewhat narrower than fore wings, cilia 2; veins 4 and 5 stalked; fuscous-grey, paler towards base cilia whitish-fuscous.

Grahamstown, South Africa; one specimen. A distinct though inconspicuous species, belonging to the group of *B. desidella*.

Placostola, n. g.

Head smooth. Ocelli absent. Tongue well-developed. Antennæ longer than fore wings (according to Stainton), filiform, basal joint elongate, without pecten, with a tuft of scales above. Labial palpi long, recurved, slender, smooth-scaled, terminal joint shorter than second, acute. Maxillary palpi very short, drooping, filiform. Posterior tibiæ clothed with dense rough hairs above, outer spurs half inner. Fore wings with vein 1 furcate, 2—5 parallel, 7 and 8 stalked, 7 to costa. Hind wings $\frac{2}{3}$, linear-lanceolate, with tooth of scales from bend of costa near base, cilia $3\frac{1}{2}$; veins 2—5 tolerably parallel, 6 and 7 closely approximated towards base.

Closely allied to *Stathmopoda*, from which it differs by the basal tuft of antennæ. The neuration is identical. To this genus I refer without doubt the Indian species described by Stainton (Trans. Ent. Soc., 3rd Ser., I.) as *Gracilaria resplendens*; closely agreeing with mine in appearance and in the structural details given, except that, as the antennæ of my specimen are broken in the middle, I cannot verify the statement as to their being longer than the fore wings. The peculiar shape of the fore wings, accurately given in Stainton's figure, is very characteristic of *Stathmopoda* and allied genera (of which I have many species), and is never to my knowledge reproduced in the *Gracilariadæ*. Probably both Stainton's specimen and my own are females.

Placostola diplaspis, n. s.

♀ (?), 8 mm. Head shining white. Palpi, antennæ, thorax, and legs whitish-ochreous, femora white. (Abdomen broken.) Fore wings very narrow, broadest near base, gradually narrowed to acute apex; brownish-ochreous, ferruginous-tinged; two large shining snow-white transverse blotches, margined with ferruginous; first about one-third, triangular, apex resting on costa; second about two-thirds, subquadrate, anterior margin convex; cilia whitish-ochreous, more ferruginous-tinged round apex. Hind wings and cilia ochreous-grey-whitish.

Aden, Arabia; one specimen, taken by Mr. G. H. Raynor, in January. Easily distinguished from *P. resplendens* by absence of white apical spot of fore wings, more triangular first and less triangular second blotches, and pale hind wings.

XIV. *Notes in* 1886 *upon lepidopterous larvæ, &c.* By Edward B. Poulton, M.A., F.L.S., F.G.S., F.Z.S., of Jesus and Keble Colleges, Oxford.

[Read April 6th, 1887.]

Plate X.

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1. Notes upon the young larvæ of Smerinthus populi, and upon the red spots in Smerinthus larvæ :—

α. The markings of the young S. populi larva.—A young yellowish green larva of this species was carefully examined when it was advanced in the second stage, and 13 mm. long when extended at rest. It possessed the red spot on two of the segments, but a description of this feature will be found below. At this stage the yellow marginal lines of the face terminate upwards in

two apical tubercles, which are especially large but not predominant, and are without any distinctive colour. Two dorsal tubercles are especially distinct upon the second and the third thoracic segments, continuing anteriorly the direction of the barely recognisable eighth stripe, as in the young *Sphinx ligustri*, in which, however, the marking is far more distinct and persistent. A semicircular crown, of especially large tubercles, extends in the vertical plane immediately behind the head upon the most anterior annulus of the first thoracic segment. There are about fifteen tubercles in the semicircle, and they are directed forwards, and produce a very striking effect. The first and seventh stripe are especially large and distinct; the stripes and the subdorsal are chiefly made up of tubercles, but there is some suffusion of the ground colour, which is (as usual) complete in the posterior part of the seventh stripe upon the eighth abdominal segment. The first stripe extends anteriorly as a line of tubercles on to the thoracic segments, becoming at first horizontal and parallel with the subdorsal, but appearing to rise on the first thoracic segment, and joining the ends of the semicircular crown; but in the anterior part of its course the line becomes very difficult to follow. The seventh stripe is also continued forward to the anterior limits of the sixth abdominal segment. There are oblique stripes (chiefly made up of shagreen dots) just above the claspers on the third, fourth, and fifth abdominal segments. These lines are more nearly horizontal than the ordinary oblique stripes, and their relation to the latter is doubtful. They may represent the forward extension of the fourth, fifth, and sixth oblique stripes (respectively), but they have also the appearance of a subspiracular line twisted into partial parallelism with the oblique stripes. Hence an examination at this stage adds nothing to our knowledge of these lines, which are also found during the whole subsequent life of the larva, and which I have previously described in the last stage (Trans. Ent. Soc. Lond., 1885, Pt. II. (Aug.), p. 297). The extension of the first stripe and the semicircular crown are not equally distinct in later stages, but the latter is easily recognisable. The eighth stripe disappears. The whole comparison strongly confirms Weismann's conclusion

as to the extreme uniformity, and therefore the ancestral character, of the appearances witnessed in the ontogeny of this species.

β. *The young larva of Sesia bombyliformis, &c.*—I have found a note, in Prof. Westwood's 'Modern Classification of Insects' (1840, vol. ii., p. 366), which proves that the yonng larvæ of the genus are spinous, and thus resemble all the other young *Sphinx* larvæ which have been examined for this character. At that time the character had not been described in any other of the *Sphingidæ*, and therefore Prof. Westwood looked upon the genus as aberrant. The note is as follows:—"*Sesia* (*S. bombyliformis*, &c.) is certainly the most aberrant genus in the family, the caterpillars being slightly pilose; and when about ten days old they have several furcate spines upon each segment of the abdomen that entirely disappear when they are full-fed, according to the information given by Mr. Dale to Mr. Curtis. The full-grown caterpillar is, however, evidently Sphingideous." The fact that the spines are furcate compares in an interesting manner with the character of these structures in the genus *Smerinthus*.

γ. *Further notes upon the red spots of Smerinthus larvæ*:—i. *Smerinthus ocellatus*.—In two mature larvæ, captured in August, 1886, the red spots were more developed than in any other individual of this species hitherto described. Both were light yellowish green varieties, although not extreme forms, and both were found upon *Salix triandra* near Oxford. The most extreme variety is represented in Plate X., fig. 1; but the other only differed in the absence of the minute dot of the upper row on the first thoracic segment. The small size of the upper dot on the seventh abdominal segment is noteworthy, and was the same in both individuals. Comparing these larvæ with that figured in one of my previous papers (Trans. Ent. Soc. Lond., 1884, Pt. I., p. 27, &c.), it is seen that in the larvæ here described the spots of the two upper rows are larger and extend on to more segments, while those upon the claspers are much larger and more distinct. In breeding large numbers of this species I found the spots in various degrees of development upon many of the whitish larvæ, although more frequently upon the yellowish varieties. This observation confirms the

single instance of a spotted whitish larva, which I recorded last year.

ii. *Smerinthus populi*. — I have had the opportunity of making notes upon the red spots upon larvæ in early stages. Seven young larvæ, fed upon *Populus nigra*, were kindly given me by Mr. A. Sidgwick, of which, on July 15th, the youngest (No. 1) was advanced in the second stage, and 13 mm. long when extended at rest. It was a bright yellowish green variety, and possessed distinct red spots on the third abdominal, and very minute ones on the second thoracic segment. The other six larvæ were changing their skins for the second time, and they were all about 15·5 mm. long. Two larvæ were yellowish green (but not extreme forms), of which one (No. 2) had large spots on the third abdominal and on the second thoracic segments, the former being the larger; there were also very small spots on the fourth abdominal, and still smaller on the first abdominal. The other larva (No. 3) had very small spots on the third abdominal only. Four larvæ were bluish green, two being more distinct varieties; and of these one (No. 4) had rather large spots on the third abdominal only, the other (No. 5) having no traces of the spots. Of the two remaining larvæ—less decided varieties of the same colour—one (No. 6) possessed distinct but rather small spots on the third abdominal, smaller and less distinct spots on the first abdominal, and far smaller, so as to be hardly visible, on the second thoracic segment. The other larva (No. 7) had well-developed spots on the third abdominal only. On July 18th the larvæ were re-examined. No. 1 was changing its second skin, and the red spots were much less distinct, although visible. The other six larvæ had now entered the third stage. No. 2 possessed large and distinct spots on the third abdominal, and small, although distinct, spots on the second thoracic segment, while there were very faint and minute ones upon the fourth abdominal. No. 3 had lost all traces of the spots. No. 4 possessed a spot on the left side only of the third abdominal. No. 5 was as before. No. 6 had the merest trace upon the third abdominal only. No. 7 was as before.

These observations certainly confirm Mr. William White's observations upon the comparatively early

appearance of these features, but they also conclusively show that the characters do not necessarily develop in the successive stages, but that they may gradually decrease and disappear in the course of development, just as if they were features of phylogenetic significance only. Extended observation will, I feel sure, confirm this conclusion, and will prove that the spots are present upon a much larger proportion of young larvæ than upon those in the later stages, although it is well known that in a certain proportion of the latter the character reaches a pitch of perfection which has not been hitherto described in the earlier stages. The first appearance of the spots upon the third abdominal segment, and then upon the second thoracic, has already been proved by Mr. White,—a conclusion which is abundantly confirmed by my observations.

On September 21st I found two larvæ of this species upon balsam poplar at Bembridge (Isle of Wight). Both possessed the spots to a remarkable extent. One larva was about half-grown in the last stage, and was of a yellowish green ground colour. The other was adult, and a very white variety, exactly resembling in ground colour that figured by Mr. Bignell, and represented in my paper (Trans. Ent. Soc. Lond., Pt. I., April, 1884). The spots of the upper row in both larvæ are arranged below in the order of relative magnitude, the largest spots being numbered first :—

Yellow larva—(1) abdominal, 7 ; (2) abdominal, 3 ; (3) abdominal, 4 ; (4) abdominal, 2 and 5 ; (5) abdominal, 1 ; (6) thoracic, 2 ; (7) thoracic, 3 ; (8) thoracic, 1, and abdominal, 6.

White larva—(1) abdominal, 3 ; (2) abdominal, 4 and 7 ; (3) abdominal, 5 and 2, and thoracic, 2 ; (4) abdominal, 1 ; (5) abdominal, 6, and thoracic, 1 and 3,—all these very small.

There was also a reddening of the upper side of the base of the horn in both larvæ.

Nos. (1) and (2) of the yellow larva were almost equal, so that the spot which appears first in the young larva is one of the largest in the adult, but the same comparison does not hold with the spots which appear next in order. It is strange that the spots should be so large upon abdominal 7, for in *S. ocellatus* this segment is remarkable for the minute size of its spot, which is

only present in extreme varieties. Furthermore, in *S. tiliæ* the red band or spot was remarkably small upon this segment. Hence it is probable that *S. populi* is abnormal in this respect. The larvæ here described probably indicate that the spots in the larva already referred to, as figured by Mr. Bignell, are represented as too numerous in the anterior part of the body, for in neither of these extreme varieties did the number of spots in any row ever exceed the number of the segments.

The spiracular row of spots was well marked in these larvæ, and a small spot appeared on the third thoracic segment and a larger one upon the second in the yellowish larva; the latter spot being well developed in the whitish larva, but the former and that around the prothoracic spiracle could not be seen when the larva was examined (perhaps because it was examined somewhat late, after the changes of colour before pupation had commenced).

The claspers were all marked, but this row was not well developed, the spot on the anal clasper of the yellowish larva being especially small.

A character, new to me, was the extension of the system on to the head. The head of the yellowish variety is represented from the left side in Plate X., fig. 2, × 2 diameters. The chief colour is on the area of the ocelli, and it extends over the marginal line as a linear vertical mark on the face. The apex is also suffused, the colour extending on to the sides of the upper part of the face. The red tint formed the ground colour, for there were no red apical tubercles. The whitish larva possessed the ocellar and apical red areas, but not the extension of the former.

On July 6th I had the opportunity of examining a number of larvæ, reared by Mr. Arthur Sidgwick from a single batch of eggs, and all fed under the same conditions of light, and with the same food—*Populus nigra* and balsam poplar. The colours and development of spots is seen to be very heterogeneous.

Stage of larva.	Tint of ground colour.	Red spots.
1. Beginning of last stage.	Bright yellowish green.	*Upper row.* — Spot on 3rd abdominal; slight suffusion of spiracles on abdominal segments 2, 3, 4, 5, and 6 of right side; and left, on the 1st and 7th abdominal, as well.
1. ,, ,,	,, ,, ,,	No spots.
1. Near beginning of last stage.	,, ,, ,,	,, ,,
1. Small (in stage 3 or 4).	Rather yellowish.	,, ,,
1. Almost mature.	Yellowish, but not extreme.	,, ,,
3. ,, ,,	Bluish green.	,, ,,
4. Small, in last stage.	,, ,,	,, ,,
3. ,, ,,	On bluish side of an intermediate variety.	A spot on the side of 3rd abdominal only.
3. Almost mature.	,, ,, ,,	No spots.
1. ,, ,,	Intermediate.	,, ,,
1. Small, in last stage.	,,	,, ,,
3. Changing 3rd or or 4th skin.	Bluish green.	,, ,,
2. ,, ,,	Intermediate.	,, ,,
1. Advanced in last stage.	On bluish side of an intermediate variety.	,, ,,
2. Small, in last stage.	On yellowish side of an intermediate variety.	,, ,,
1. ,, ,,	,, ,, ,,	Spot on 3rd abdominal, and the faintest suffusion of the middle abdominal spiracles.

iii. *Smerinthus tiliæ.*—During the past summer I reared a large number of larvæ from a single batch of eggs obtained from a captured female. Many of the larvæ possessed the red markings, which seemed to be extremely linear on their first appearance, forcibly

reminding me of the earliest traces of purple borders in *Sphinx ligustri*. As the larvæ entered the later stages the red borders contracted and became broader, finally assuming the well-known appearance of somewhat elongate spots on the anterior margin of the oblique stripes. I have already mentioned the relatively slight development of the red marking upon the seventh abdominal segment. This observation of the primarily linear appearance of the spots seems to indicate that these features in *S. tiliæ* have arisen from a modification of a normal coloured border, as I suggested last year (Trans. Ent. Soc. Lond., 1886, Pt. II., p. 139):—"It seems possible that the appearances seen in *Smerinthus tiliæ* are due to a fading away of the character (*i. e.*, coloured borders) instead of its origin. In the other *Smerinthus* larvæ the shortening borders may have been arrested at the spot-stage, which has evidently been made use of as an independent larval marking, and which has received additions in the other rows."

2. Description of an unnamed Sphinx larva from Celebes. — My friend Dr. S. J. Hickson, of Downing College, Cambridge, very kindly brought me a well-preserved specimen of a mature Chærocampoid larva from Celebes. The larva is represented in Plate X., fig. 3 (natural size), and is extremely interesting in uniting the characteristics of several genera of the *Sphingidæ*. In the first place it possesses the terrifying eye-like marks on the first abdominal segment, although there is no trace of similar markings on any of the other segments. In the genus *Chærocampa* (and in closely allied genera) the chief terrifying marks are upon the same segment, but there are generally other smaller marks on the second abdominal and sometimes also on the third thoracic segments, while in many species traces of the marks are repeated on abdominal segments 3—8. The marking itself consists of a small and narrow black "ground area," a normal white "mirror," and an intensely black "nucleus," within which again are some minute white markings. The only other larva I can find described with but a single terrifying mark (similarly placed) is *Pergesa mongoliana* (A. G. Butler, Trans. Zool. Soc., vol. ix., part x., 1876). It appears probable that a single pair of such markings,

appropriately placed and highly conspicuous in the terrifying attitude, must be at least as efficient in causing alarm as a greater number of markings. And as a matter of fact, in Prof. Weismann's figure of *C. porcellus* in the terrifying attitude, it is shown that the single pair (which are by far the largest) on the first abdominal segment are prominent and alone produce any effect, the marks on the second abdominal segment being insignificant and partially concealed, while the marks repeated on other segments are of great morphological interest, but of no functional importance. Dr. Hickson informs me that the terrifying attitude was very perfectly assumed by the larva, as we should expect from the tapering of the body anteriorly and the small head, by which the complete retraction into the part possessing the eye-like marks is rendered possible. All this is typical of *Chærocampa*. It is noteworthy that the anterior part of the marking extends on to the third thoracic segment. The marking occurs as an interruption of the subdorsal line, thus indicating its origin from the latter, as Prof. Weismann has shown, and the line itself persists faintly along its whole length, existing as a lightish and often interrupted stripe immediately below the line in which the rather darker ground colour of the dorsal area terminates. This arrangement very much resembles that which I have previously described in *Smerinthus*. The ground colour was green, as in the young stages of *Chærocampa*, and in a small proportion of the mature larvæ (in the two English species), but it retains distinct traces of shagreening over the whole surface, and the caudal horn is sprinkled with typical hair-bearing tubercles. The persistence of the shagreen dots upon the horn resembles *Acherontia* (and other genera), but the general surface of the larva has far more distinct traces of these structures than are found in this genus. Very large white dots remain on the sides of the third thoracic and first abdominal segments, in the same situation which is marked by a conspicuous light patch in *Chærocampa elpenor*. The shape of the caudal horn is peculiar, but very unlike that of *Chærocampa*, being large and strongly curved downwards towards the apex, and tapering very suddenly close to the point into a conical form. Except in the last point, which, as far as I know, is peculiar, the

shape of the horn suggests *Sphinx*, just as its surface suggests the closely allied genus *Acherontia*. There are six oblique white stripes on the sides, with distinct anterior borders formed of darkened ground colour, while the borders are faintly continued on to the dorsal area, and above the subdorsal tend to meet in a series of Vs. This latter suggestion of the first and "eighth stripe" is also present in the normal position, and the whole arrangement almost exactly recalls that of *Smerinthus* and the early stages of *Sphinx ligustri*. Thus the seventh stripe is especially prominent, and runs up into the base of the caudal horn, while the posterior part of the subdorsal is continuous with the stripe, exactly as in the above-mentioned genera. This remarkable union of characteristics of such different genera serves to indicate the morphological identity of the faint oblique stripes of *Chærocampa elpenor* and of *C. porcellus* with the more distinct markings of *Smerinthus* and *Sphinx*, and I have little doubt that these features will be found to exist in the younger stages of *Chærocampa*, when they are examined with this object in view. The last character is an extremely ancestral feature,—the permanence of the dorsal tubercles which I have described in the younger stages of *Sphinx* and *Smerinthus*. These persist as two pairs of white marks upon the dorsal surface of the abdominal segments in front of the eighth; white spots also occur on the dorsal surface of the thoracic segments. Traces of at least one of the two lateral tubercles can also be faintly made out as an especially white part of each stripe above and rather behind the spiracle. Since my description of these tubercles in young *Sphinx* larvæ a paper has appeared by Dr. Wilhelm Müller ("Südamerikanische Nymphalidenraupen," 'Zoologischen Jahrbüchern,' J. W. Spengel. Jena, 1886), in which he describes the same tubercles in larvæ of many widely-separated groups, and calls them the "primitive tubercles." Before I read his paper I had also recognised them in many different larvæ, and had regarded them as very primitive features. In fact, I had discussed with Prof. Meldola my intention to work out these characters, which are common to widely-separated larvæ, and from them to endeavour to reconstruct, as far as possible, their arrangement in the ancestral larva. Dr. W. Müller has, however, now

worked out the arrangement of the primitive tubercles very completely, and I only mention my own observations in connection with the subject as an entirely independent confirmation of his conclusions. I think it is extremely probable that the white spots occurring in pairs upon the dorsal surface of the mature larvæ of *Chærocampa elpenor* and *C. porcellus* (figured by Weismann) represent one of the two pairs (probably the posterior) of the dorsal primitive tubercles. If this be the case they will be found, with the other pair, at earlier stages of the ontogeny, and will be found to assume the appearance of tubercles. Although the traces of the primitive tubercles merely take the form of white patches in Dr. Hickson's larva, yet there is no other *Sphinx* larva hitherto described in which the position of so large a part of the primitive characters are distinctly indicated in the later stages. The ontogeny of such a larva is probably extremely uniform.

3. Further observations on the protective attitude of Geometer larva:—*α. The spiral or irregular position assumed by young larvæ resting on leaves.*—I am now able to add observations of two species, in addition to those previously described. The young brown larvæ of *Selenia lunaria* twist themselves into an irregular spiral when seated on the leaves of their food-plant, and this attitude is sometimes assumed by the mature larvæ when resting in such a position. The young brown larvæ of *Rumia cratægata* also have the same habit, generally sitting on the edge of a leaf close to the piece which they have eaten out of it. In this position the larva suggests most strongly the appearance of a small part of the leaf which has been injured in some way, and has curled up and turned brown, but still remains adherent by one end to the uninjured part of the leaf.

β. The supporting thread sometimes dispensed with in the twig-like attitude. — Although the almost invisible thread is invariably made use of in all the most perfect and elaborate resemblances to twigs, I have observed that in an effective and well-concealed form of this protective appearance the larva (in the case of *A. betularia*) is supported in another way, *viz.*, by holding a branch, leaf-stalk, or leaf in the clasp of its thoracic

legs. Thus the larva often presents the appearance of a twig passing obliquely from one branch to the other, and, although such a position seems likely to attract attention because it represents something unnatural, yet in reality the concealment is very perfect, for the twigs of the food-plant (birch) are so extremely numerous, and present such a complicated network to the observer, that one such oblique twig-like appearance readily escapes detection, and may often fall into the line along which a real twig is prolonged. Very commonly the larvæ are supported anteriorly by holding the leaves or stem of the branch to which the claspers cling, and in this case the concealment among the interlacing twigs of the food-plant is even more perfect. It is probable that the same mode of support will be found to hold good in other species of *Geometræ*. The attitude is shown in Plate X., fig. 4, a green variety of *A. betularia* being figured on a twig of birch.

γ. *The softening of the contact between a Geometer larva and the twig on which it is resting.* — In a note to the translation of Weismann's 'Essay on the Markings of Caterpillars,' p. 292, Prof. Meldola states as follows :—" The adaptive resemblance is considerably enhanced in *Catocala* and in *Lasiocampa quercifolia* by the row of fleshy protuberances along the sides of these caterpillars, which enables them to rest on the tree-trunks by day without casting a sharp shadow. The hairs along the sides of the caterpillar of *Pœcilocampa populi* doubtless serve the same purpose." This explanation, which had been previously given by Professor Meldola, is accepted by Sir John Lubbock (Trans. Ent. Soc. Lond., 1878, p. 242) and by Mr. Peter Cameron (*ibid.*, 1880, p. 75), and the latter writer extends the explanation to the hairy larvæ of certain phytophagous Hymenoptera. I can now bring forward a confirmatory observation which supports the explanation offered by Prof. Meldola in the strongest manner. The larvæ of *Geometræ*, in the typical attitude of protective resemblance to a twig, only touch their food-plant at and between the two posterior pairs of claspers, and this part of the larva, in relation to the food-plant, of course represents the point at which a twig is united with the branch immediately below the divergence. At such a point the bark of twig and branch are continuous, and

anything which suggested a deep furrow between them would destroy the protective resemblance. At one point only in the body of a Geometer larva is there any necessity for maintaining apparent continuity with the food-plant, and at this point only in the larvæ which I have examined fleshy tubercles like those described above (in *Catocala*, &c.), are developed. In fig. 1 the

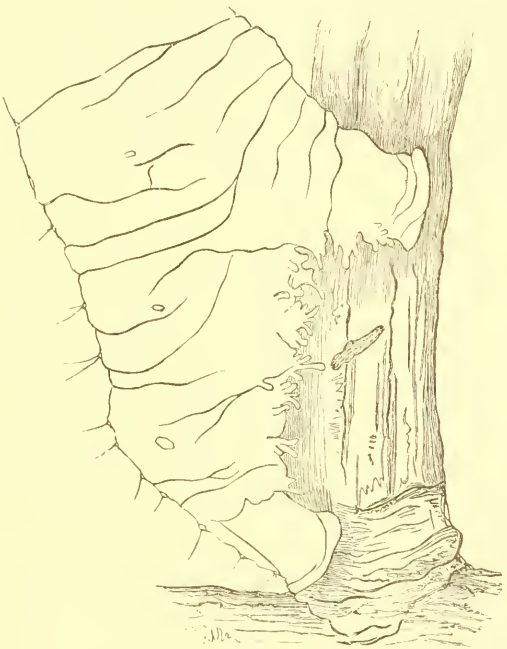

Fig. 1.

posterior part of the body of the larva of *Rumia cratægata* is shown (× 9 diameters), and the fleshy processes are seen to exactly correspond to that part of the body which would otherwise cause a dark shadow in the deep cleft between itself and the branch. The effect of the fleshy processes is diagrammatically shown in fig. 2, in which (*a*) represents a section across two branches immediately below the point at which they have divided, (*b*) represents a section across the larval body between the two posterior pairs of claspers, showing the formation of a deep cleft, while (*c*) shows

how the outline of the larva on the branch is approximated to that of (*a*) by means of the processes. Although the cleft is largely filled up in (*c*), a considerable furrow remains, but this is not apparent

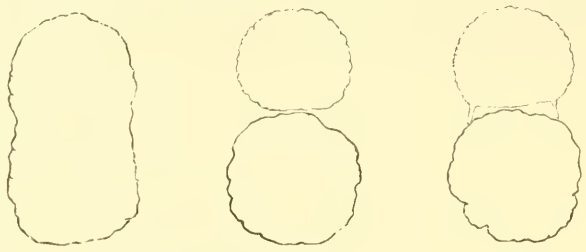

Fig. 2.

because of the light colour of the fleshy processes, which prevent the attention from being directed to the shadow which would otherwise indicate the position of the groove. The processes therefore attain the object of softening the contact between the larva and its food-plant in a two-fold manner, by partially filling up the cleft, and by neutralising the shadow in the groove which remains. I have also noticed the processes in the larva of *A. betularia*, and I believe that they are of very general occurrence in *Geometræ*. The appearance of such structures in the one small part of the larva where such a cleft exists and their absence elsewhere, together with their obvious function in this and the other cases, seem to render Prof. Meldola's explanation a matter of certainty.

δ. *An extreme instance of the specialisation of a larva to its normal food-plant.* — We occasionally meet with larvæ which are specialised in relation to the minute details of their peculiar food-plants, or of their commonest food-plants, if the larvæ occur upon more than one. Such specialisation in the details of protective resemblance would seem to imply an extremely ancient association of the larvæ with their food-plants, and it may occasionally aid us in deciding upon the ancestral food-plant of a larva out of the many species of plants which may be eaten. Such an ancestral association must have existed between the larva of *Deilephila Hippophaes* and its food-plant, *Hippophaes rhamnoides*,

for not only are the colours of the leaves faithfully reproduced, but the characteristic orange berries are represented by an orange spot at the base of the caudal horn upon each side, as was pointed out by Weismann, and as I can confirm from my experience of the larva at Visp in Switzerland. In the case of *Rumia cratægata* it is similarly possible to affirm that hawthorn is the food-plant with which the larva has been longest associated out of the several species of plants upon which it also occurs. On Plate X., fig. 5 (natural size) a drawing was made of a living example of this larva as it rested upon a twig of hawthorn. It is at once seen that the dorsal tubercles placed on about the middle of the length of the larva very faithfully represent a superficially similar structure upon many of the side twigs of the food-plant. Not only do these projections occur towards the middle of the length of the twigs, but they are situated on the angle of a slight bend, a character which is also reproduced in the larval form. Furthermore, the mode in which the different varieties of the larva are coloured is almost exactly the same as in the varying twigs of this plant. The bark is covered by a thin superficial layer which is of a bluish-grey colour, while the deeper layers beneath are brown, or green, or mixed brown and green, becoming visible over a large part of the surface owing to the breaking away of the former layer. Hence the colour of the branches is brown or green, mottled with grey, and not only is this the exact appearance of the larva, but the way in which the colours are blended is precisely similar in the animal and the plant. The darker colours of the larva may be brown, or green, or mixed brown and green, mottled in all cases with bluish grey. Such remarkable specialisation to the details of single food-plant certainly warrants the suggestion that the association is very ancient,—that *Cratægus* is the ancestral food-plant of *Rumia cratægata*.

4. A FURTHER ACCOUNT OF THE DEFENSIVE STRUCTURES OF THE LARVA OF DICRANURA VINULA.—In my last paper (Trans. Ent. Soc. Lond., 1886, Pt. II., June, pp. 156—158) I gave an account of defensive appearance and habits of the larva of *D. vinula*. I am now able to give a figure of the larva in the terrifying attitude (see Plate X.,

fig. 6, nat. size). The larva appears to depend entirely upon tactile stimuli for the direction in which to move its terrifying full-face, and towards which to eject the irritant acid secretion. Visual sensations appear to play no part as guides in the assumption of the defensive attitude. The large and full-fed larva which is represented in fig. 6 was only sensitive to tactile impressions, and the slightest touch upon either side or upon the back was always followed by a corresponding movement of the anterior part of the larva, and the attitude thus taken up on each occasion was maintained for some considerable time, although instantly altered when another part of the body was touched.

In the same paper (*loc. cit.*) I described a complex form of prothoracic "gland" which was everted by applying pressure to the larva of *Dicranura furcula*. I have now found that a similar "gland" is present in *D. vinula*; and I wish to correct an error in the description of this structure given in my last paper. The account was written from the memory of an observation made many months before in Switzerland, and it is wrong in describing the everted gland as consisting of six diverging processes. In reality two lateral processes—or everted gland-tubes—are present upon each side, while a median pouch represents the partially everted sac, in which the irritant secretion is stored. All are coloured green from the green blood which is forced into them, on eversion. These structures are most easily everted in *D. vinula* at the beginning of the last larval stage, a time when all the defensive structures appear to be at their highest state of functional activity. At this time the caudal filaments are large and brightly coloured, and are extremely sensitive; while later in the stage they decline in importance, and generally cease to be capable of eversion. The larva does not seem to be able to evert its prothoracic gland voluntarily, but very slight pressure is at this very sensitive period sufficient to cause eversion. It appears probable that this structure, starting as an ordinary gland, became voluntarily eversible like the ventral glands of *Cræsus* and the dorsal glands of the larvæ of *Liparidæ* described in the next section, and that the power of eversion has been very recently lost, as the larva has acquired the remarkable power of ejecting the intensely irritant secretion to a

considerable distance by forcing it through the narrow chink with its closely approximated lips, which constitutes the mouth of the duct leading to the sac. Such a formidable means of defence may readily have supplanted the more usual method of eversion, a method which can only give rise to the discharge of vapour into the air, instead of a well-directed stream of fluid, which, if volatile, as it is in these larvæ, of course produces abundance of vapour.

The appearance of the everted gland is indicated in Plate X., fig. 7 (× 2 diameters), in which the head and prothorax of a larva in the sensitive period are shown from below. Of the four gland-tubes the anterior pair are seen to be much larger and longer than the posterior pair. The position of the structures corresponds with that of the horizontal slit-like mouth of the short duct leading to the sac, through which eversion takes place, and which is shown upon the red prothoracic margin of the head, below the true mouth, in fig. 6. In an earlier paper (Trans. Ent. Soc. Lond., 1885, Pt. II., August, p. 322) I have given an account of the eversion and introversion of the pink flagella of the larva of *D. vinula*. I have now studied the subject more thoroughly, and can add further details. In Plate X., fig. 8 (× 8 diameters) the left conical receptacle is seen from the left side, with its flagellum completely everted. Immediately above the receptacle the basal section of the flagellum is white or very faintly pinkish, and through this part the rest of the flagellum can be seen to pass during eversion and introversion. The withdrawn flagellum can also be seen with a little care in the receptacle itself. It follows from such a constitution that the summit of the receptacle when the flagellum is introverted represents the rim of a tubular depression, of which the lumen is bounded by the morphologically outermost,—the cuticular layers of the flagellum itself. In eversion the rim rises to successively higher levels as each section of the outer part of the flagellar cuticle passes over its edge, and becomes truly outermost in position, and, last of all, the apex is unfolded, and the rim then disappears. Conversely, in introversion the apex sinks, and a rim at once appears, which also sinks until the summit of the receptacle is reached. In fact, the structure affords

an excellent example of a "pleurecbolic" introvert, "acrembolic" during introversion, very clearly described and distinguished from the converse type of introvert by Prof. E. Ray Lankester ('Encyclopædia Britannica,' article "Mollusca," p. 652). As far as I am aware, all the introverts in insects belong to this type. One result of this organisation is the extreme delicacy of the rim in the introverted organ, for the smallest injury causing a thickening or a slight adhesion on any part of the margin will entirely prevent eversion. And it is in this manner that the flagella usually become functionless: they are not otherwise injured in themselves, but are merely permanently introverted, and can easily be seen lying in the receptacle.

The organ is everted by forcing blood into it, and advantage was taken of this fact in obtaining the material from which fig. 8 was drawn. A loose ligature of silk was placed round the apex of the receptacle of a larva, and when the flagellum was fully everted on irritation the ligature was tightened, and the flagellum, being full of blood, was incapable of introversion. Another ligature was applied immediately below the former, and the receptacle divided between the two, and the flagellum was then drawn with the aid of a camera lucida. The structure was then hardened in a warm aqueous solution of mercuric chloride, and subsequently in spirit, longitudinal sections being taken through the apex imbedded after long soaking in melted paraffin. The structure of the organ, as shown by the sections, is represented in Plate X., fig. 9×188. The apparently smooth cuticle is seen to be covered with extremely minute spine-like processes. The cuticle itself is, as usual, made up of a homogeneous, superficial, and a finely lamellated deeper layer, of which the former is alone continued into the processes. Neither of these layers contain pigment in this part of the larva, but the pink colour is entirely due to the immediately subjacent hypodermis cells. These cells possess a fusiform outline when seen from the surface, while sections show them to be flattened and to overlap in an imbricated manner. The pink pigment is darkest round the margins of the cells, and especially at their apices. Beneath the cells is a very delicate layer which represents the "dermal" tissue in many other parts,

and beneath this again is a space filled with blood in the everted organ, while in the centre is the retractor muscle, made up of several bundles arranged round an axial space, which contains a large ganglion. There is little doubt that the blood penetrates the axial space and between the bundles of the muscle. The muscular tissue consists of striated fibres, and the bundles are surrounded by a sheath which must be highly elastic. The ganglion cells are very large, and their processes are often seen to be continuous with nerve-fibres. The proportion of nervous to muscular tissue is very large, a fact which is doubtless correlated with the extraordinary rapidity and extent of the muscular contraction and relaxation during intro- and eversion respectively. The extent of contraction is so great that the length of the relaxed muscle must be some considerable multiple of its length when completely shortened. All the structural details above described are plainly indicated in fig. 9.

5. Additional eversible glands in larvæ. — I feel sure that these defensive structures are of constant occurrence in lepidopterous larvæ.

α. *The larva of Liparis auriflua.*—This larva, although well protected by its irritating hairs, also possesses two median dorsal eversible glands of an orange colour. In the commonest variety of this larva there is a red dorsal band traversed by a median black line, situated over the dorsal vessel. The black line everywhere divides the red band, except towards the anterior margins of the 6th and 7th abdominal segments, where, exactly between the two tubercles which bear the long black hairs on each segment, a bridge of the red colour unites the opposite halves into which the band is divided, and the glands are present upon these bridges, their orange colour being distinct against the surrounding red. Another variety of the larva only possesses the merest trace of the red band, and the orange glands are therefore peculiarly conspicuous against a black background. The glands are not often completely everted, but they are very sensitive to tactile impressions, and on stimulation a clear transparent secretion appears in the lumen, being probably raised by partial eversion. The secretion is not acid to litmus paper, but it

possesses a peculiar and penetrating odour. These glands are, in the case of *L. chrysorrhœa*, alluded to by Duponchel, quoted in Stainton's 'Manual,' "A reddish tubercle on the back of each of the 11th and 12th segments." In this description the segments are wrongly numbered; they should be 10th and 11th. Newman, in 'British Moths,' alludes to the glands in both *L. chrysorrhœa* and *L. auriflua*: "The tenth and eleventh segments have a circular, wax-like, cup-shaped, scarlet spot on the very middle of the back." They are also described, in *L. auriflua*, as glands by Mr. A. H. Swinton in the Proceedings of the Entomological Society of London, who wrongly implies that their secretion is of value in providing a poison for the irritant hairs of the species. The glands are purely odoriferous, and have no means of discharging their fluid contents on to the hairs. Furthermore, it is probable that the hairs in this species are merely mechanical irritants: they are equally effectual for a long time after they have been shed by the larva, as I know from the experience of pulling to pieces an old cocoon in which the hairs were interwoven.

β. In the Liparidæ generally.—Finding the glands in *Liparis*, I examined the larva of *Orgyia antiqua*, and found similar structures in the same position. Last year I described a single gland on the 7th abdominal segment of *Dasychira* (*Orgyia*) *pudibunda*, evidently corresponding to the posterior of the two in the former species. I therefore asked Lord Walsingham to allow me to look through the preserved larvæ of *Liparidæ* in his collection. Lord Walsingham kindly allowed me to examine the larvæ, and greatly helped me in the search. All the *Liparidæ* were found to possess the glands, except the genus *Demas*, in which I could not detect them. Two glands occurred in all the larvæ of the other genera, except in *Dasychira* (for *D. fascelina* resembled *D. pudibunda* in only possessing the posterior gland). The glands were minute in *Psilura* (*Lymantria*) *monacha*, and small in *Hypogymna dispar*, while they resembled those of *L. auriflua* in all other British species. Examining some species of Indian *Liparidæ*, the two glands were found in *Lymantria concolor* (Walker), and where they were small and resembled those of our own *P. monacha*, to which the species is evidently closely

allied. They were also found in *Chærotricha plana* (Walker), *Charnidas exclamationis*, in three species of the genus *Artaxa* (*A. vitellina*, *scintillans*, and *guttata* [all Walker]), and in *Dasychira dalbergiæ* (Moore). I was unable to find them in a few Indian larvæ belonging to this genus, but they may have been present and difficult to detect in the preserved larvæ. Thus the character is probably almost coextensive with the family. Stainton probably recognises this in the general description of the *Liparidæ*, given in the 'Manual,' containing this sentence: "Larva . . . frequently with two fleshy protuberances on the twelfth segment." As above stated, the glands occur upon the 6th and 7th abdominal segments, *i. e.*, upon the 10th and 11th segments of the other system of terminology. The single gland of our two British species of *Dasychira* helps to unite these in a single genus, and to separate them from other species, thus confirming the classification of Stainton's 'Manual' and controverting that of Newman. All these eversible glands are "pleurecbolic" and "acrembolic," like the flagella of *D. rinula*, and all must possess an axial retractor muscle. I have proved this by means of sections in the case of the ventral glands of the larva of the hymenopterous *Crœsus septentrionalis*, one of which, in a state of partial eversion, is shown in longitudinal section in Plate X., fig. 10, × 24·5. The axial retractor muscle (*r*, *m*, fig. 10) is made up of striated fibres.

6. On markings which frequently appear on larvæ before pupation, and which correspond in position to the underlying pupal wings. — When a larva is examined in the contracted quiescent state which precedes pupation, the lateral region of the meso- and metathoracic segments are seen to be swollen. This expansion is due to the underlying pupal wings which are formed as pouch-like diverticula from the body-cavity. The larval cuticle is easily stripped off an insect which has been kept in spirit, and the pouch-like rudimentary wings are then distinctly seen to be the cause of the swollen appearance. But the rapid morphological changes which are going on beneath the surface are often attended by other modifications of the superposed larval tissues, which are far more difficult to explain.

Thus in many larvæ the swollen lateral area of both segments is seen to have undergone a marked alteration in colour. Sometimes the pigment in the larval hypodermis disappears, and the areas are coloured by the green blood of the insect (e. g., *Selenia illunaria*, and in many other larvæ); but in other cases new pigment may be deposited in the larval cuticle, and an entirely new marking may thus make its appearance at the extreme end of the larval life. The most striking instance which has come under my observation is afforded by the bright green larva of *Gonoptera libatrix*, in which the convexity of each thoracic swelling becomes covered with a black patch, that upon the mesothorax being the larger and of a deeper tint. The appearance of the anterior part of the larva just before pupation is shown in Plate X., fig. 11 (× 2). Thin sections examined under a high power reveal the fact that the pigment is placed in the superficial layer of the cuticle, thus occupying the position in which black colouring-matter apparently always occurs. This formation of pigment at such a time, and in such a position, is of great physiological interest, for either the pigment itself or its factors must have traversed the lower thicker lamellated layer of the cuticle in order to reach the thin superficial layer, thus clearly showing that no part of the cuticle is beyond the reach of physiological processes while it forms the covering of the living larva. If there were a time in which the larval cuticle could be looked upon as a mere mechanical investment it would be at this very period, when it is to be shortly cast off, and when the larval hypodermis cells are elaborating, or are just about to elaborate, a new (pupal) cuticle beneath the surface. But at this very time we have the clearest indications that the larva has not lost its organic hold upon its superficial investment. It would be of great interest to carefully investigate the exact time at which the pigment appears, and to examine by means of sections its relation to the first formation of the pupal cuticle. It is impossible at present to form an opinion as to whether the appearance is of any significance in relation to the difficult question of the origin of wings, or whether (as appears more probable) it is merely an incidental result which attends the commencement of new activities by the hypodermis cells. In Plate X.,

fig. 12 × 10, a transverse section of the mesothorax of *G. libatrix* is represented, showing the superficial larval cuticle with the black pigment present in its outer layer over an area corresponding to the swelling, which is seen to correspond with the pupal fore wing, shown in section beneath and formed as a diverticulum from the body-cavity. The pupal body and wing is covered by its own partially formed cuticle, of which the rough superficial layer is complete while the lower lamellated layer is in process of development. The details of the larval and pupal cuticle and the hypodermis cells of this region are shown in Plate X., fig. 13 × 188. The cells are seen to be remarkably long, and their deep ends are prolonged into fibre-like processes, while their superficial extremities are continuous with a layer (coloured red in fig. 13) which represents the partially developed lamellated layer of the pupal cuticle.

7. Further notes upon the larva of Paniscus cephalotes.—(1). On August 1st I found an adult larva of *D. vinula* near Oxford, and eight eggs of *P. cephalotes* were attached to it in the following positions: one egg between the 3rd thoracic and 1st abdominal segment, six between the 1st and 2nd abdominal segments, and one between the 2nd and 3rd abdominal segments. The eggs were not crowded, but nearly all were attached to the left side of the larva. Three of the eggs (out of the six described above) were near the median dorsal line, on the purple band or its white border, one of these being attached on the right side of the middle line. I was very interested to find that the larva could evert its caudal tentacles, although they were comparatively small and unimportant as a means of defence, this being always the case after the first part of the last stage. On August 11th the eggs had all developed a few days, and the development began just as the larva ceased feeding and darkened. On August 9th I removed seven out of the eight parasitic larvæ while they were quite small, two being in the first stage and six just beginning the second. The larva which was left was unhealthy and soon died.

(2). On August 24th an adult larva of *D. vinula* was sent to me by Mr. W. H. Harwood: by the next day it had become brown, and had begun its cocoon. It had

five eggs of *P. cephalotes* attached to it in the following positions: three eggs between the 2nd and 3rd thoracic segments, one of these being close to the median dorsal line and two rather farther down on the left side; two eggs at the same level as the two last described, between the 3rd thoracic and 1st abdominal segment. They had all just begun to develop before the larva arrived, but were in the first stage. When the larva darkened on the 25th the area to which the parasites were attached remained green. In this instance the larva was unable to protrude its flagella. There was every reason for the belief that the eggs had been attached to the larva before the last stage, and that DeGeer was right in saying that the skin can be changed without removing the eggs. Thus there were ragged remnants of skin round the ova at their points of attachment, and further, one of the prothoracic spiracles contained the main tracheal branch of the last stage, still lying in its lumen, seeming to show the difficulty with which the skin had been thrown off owing to the fact that it was pinned down, as it were, by the ova, so that ecdysis was only accomplished after the old skin had been torn to a considerable extent. There were minute scars near the ova, as if others had been attached to the larva, but had been torn out in ecdysis, or they may have been due to ineffectual attempts at oviposition on the part of the female *Paniscus*. In this case also all the ova were removed except one.

(3). On August 22nd I found another adult larva near Oxford, and to it only three ova were attached: one ovum between the 2nd and 3rd thoracic segments just below the white margin of the purple band; two ova between the 3rd thoracic and 1st abdominal segment, close together and in the same position. These latter ova were removed. The larva was unable to make use of its flagella. On August 25th the larva was about full-grown, and the parasites had just begun to develop.

On September 3rd larva (2) was examined, and the parasite was seen to have grown *immensely*, being far larger than any obtained last year. Its posterior extremity was detached from the egg-shell, and it was still eating the larva, although the latter was much shrivelled and was dead (recently). The *Paniscus* was very distended and glistening, being thus quite different

from those observed last year, which after detachment lost the glistening appearance. The *Dicranura* larva had not been allowed to construct a cocoon, but No. (3) was contained in one, which was opened at this date, when it was seen that the single parasite was still small, although it was growing.

On Sept. 8th, when the former larva was beginning to spin, having ceased to feed a day or two earlier, I saw in the box a freshly formed and still undarkened pupa of some internal dipterous parasite. Hence the *D. vinula* had been simultaneously attacked by internal and external parasites of very different kinds. On Oct. 4th the box was opened, and it was found that the dipterous imago had emerged from the pupa many days before, and was dead. The species was ascertained to be *Tachina quadripustulata*.

On Sept. 11th the larva had constructed a large scaffolding of white silk over the remains of the *Dicranura* and the dipterous pupa. The larva No. (3) had now become very large, although not quite so large as the other; it had just begun to spin, having ceased to feed at about this date. From the previous observation of this larva it was seen that all the increase in size which follows an unusual supply of nourishment takes place *after* detachment, and that the larvæ are of nearly uniform size when they are detached. The length of the larva at this date was 22·5 mm., when rather stretched and very nearly straight.

On Sept. 16th the larva was rather smaller, having become slightly shrunken during the process of spinning a scaffolding. At this date it was drawn from two points of view, and it is seen in Plate X., fig. 14 (ventral view), and fig. 15 (lateral view), both figures being of the natural size. The silk spun by both the larvæ was white at first, but subsequently became dark. No. (3) did not construct a cocoon, but expended its silk in making a large scaffolding in the chip-box, but the central depression in which the larva now lies has the form of a furrow with well-defined sides, and probably represents the beginning of a cocoon. Larva No. (2), as it wandered over the chip-box spinning a scaffolding, came upon the hard cocoon which had been spun by the *D. vinula*, and entered through the hole by which the latter had been removed. In the smaller cavity it

constructed a perfect oval cocoon. This entirely confirms my conclusions of last year, that the larvæ fail to make cocoons in a comparatively large space, because all their silk is exhausted in the scaffolding.

Thus larva No. (2) fed during a period of about fourteen days, and the other for about seventeen days; so that the duration of growth is precisely similar to that of the larvæ described last year (also extending from fourteen to seventeen days), although the size attained was far less in the latter case. The conclusion that the amount of growth is independent of the duration of the whole feeding period is also shown in the fact that the larger of the two larvæ (1886) ceased to feed in the shorter time. It is also interesting in relation to the same conclusion that larva No. (2) killed its host in eleven days, while in 1885 the *Dicranura* larva lasted through the attack of seven parasites during twelve days. On the subject of the size of these two larvæ, Mr. E. A. Fitch informs me that size is so entirely irregular among the imagos of the *Ichneumonidæ* that it cannot be adopted as any criterion of specific identity. It is exceedingly interesting to find so perfect an adaptation to the necessarily uncertain amount of food obtainable in the larval stage. I look forward with interest to the appearance of the imagos of my larvæ, for they have probably reached the upward limit of attainable size, inasmuch as the *Dicranura* larvæ did not seem to be completely eaten when the *Paniscus* larvæ ceased to feed.

I am now able to add the duration of the pupal period in *Paniscus*. In my last paper I described six larvæ (1885) as pupating May 17th—25th. On June 15th three imagos emerged, another appeared on the following day, and the remainder a few days later. Thus the pupal period lasts for about four weeks. Each imago directly after emergence ejects short white cylinders of excreta, which from their appearance are probably some product of nitrogenous metabolism. It is thus seen that these imagos appear some weeks before the time at which the larvæ of *D. vinula* have arrived at the stages of growth in which they are liable to the attacks of these parasites. A number of cocoons of *D. vinula* were kept under the same conditions as the *Paniscus* larvæ and pupæ, with the result that the eggs laid by the imagos of the former hatched at the time when the *Paniscus*

imagos emerged. I endeavoured to keep the latter insects alive in glass cylinders, until the *Dicranura* larvæ were advanced in size, but they only lived for about a week. The mature larvæ of *Tæniocampa gothica* were offered to them, and on one occasion I witnessed an attack made upon one of these by a virgin female *Paniscus*. The struggling larva was firmly held by the hooked feet of the hymenopteron, while the mandibles of the latter were deeply embedded in its body, so that it bled freely; at the same time the sheaths of the horizontal ovipositor were held erect, as if the organ were about to be used. At this critical point I was obliged to leave in order to catch a train, but I afterwards found that no eggs had been affixed to the larva, which had died in consequence of the injuries inflicted upon it. I certainly gained the impression that the *Paniscus* was partially eating the larva, for so severe a bite would of course have entirely prevented the latter from acting as food for the offspring of the *Paniscus*. Furthermore, I have not found any scar on the *Dicranura* larvæ with eggs attached to them, which would indicate such severe treatment.

I wish now to correct a mistaken account which I gave last year of the ovum and the newly-hatched *Paniscus* larva. The mistake was due to the fact that the ova were partially hatched when I first examined them. In Trans. Ent. Soc. Lond., Pt. II., June, 1886, p. 164, I thus described the ovum:—"The free anterior pointed end of the ovum is marked off from the rest by a distinct line, and after development begins it remains attached to the young larva as a black and shining head-shield." The fact is that the unhatched ovum is rounded anteriorly, and exhibits no lines upon its surface, but in hatching it splits along the lower surface, corresponding to the ventral line of the enclosed larva, the line of separation passing upwards over the anterior and on to the front part of the superior surface of the black shell of the ovum. The head of the larva partially protrudes through the anterior part of the fissure thus made, and it is black and shining on its upper surface, exactly resembling the shell of the ovum. Gradual growth brings the head completely out of the ovum, being separated from it by the white larval body; but for many hours the head can alone be seen on an

examination of the ovum from above, and at such a time it exactly presents the appearance described in my last year's notes. Furthermore, the head is not black and shining at any other larval stage, so that my mistake was very natural. The position of the young larva

Fig. 3.

relatively to the egg-shell is shown in fig. 3; at the stage of growth which is represented the head is just outside the shell, and separated from it by one or two of the thoracic segments. It can be readily imagined that when the head is alone seen between the valves of the shell, which it exactly resembles in colour, the whole suggests an egg-covering marked by sutural lines. The harmony in colour is doubtless protective, for it renders the young larva indistinguishable from the egg during the earliest period of growth. The head is seen in the figure to be relatively large and well-developed; it is probable that a minute examination may show more distinct traces of the sense-organs and other structural features than in the later stages, and it is to be expected that these external hymenopterous parasites will preserve clearer indications of the ancestral non-parasitic forms from which they have been derived than those which are presented by the more degenerate ento-parasitic species. Now that I have the material I hope to investigate the structure of *Paniscus* larvæ by means of sections.

8. A special point in the protective attitude of the imago of Gonoptera libatrix. — The shape and colour of this moth forcibly suggest the appearance of a red leaf spotted with a few white bosses of fungoid

growth. The time of emergence and the habit of hybernation in the perfect stage correspond with the period of year at which the resembled objects form a predominant feature in nature. The moth is eagerly pursued and keenly relished by birds, so that it is of the greatest importance that the protective resemblance should be as perfect as possible, and that any indispensable structure which would interfere with the resemblance should be as far as possible concealed in the attitude of rest. On examining the moth I was very interested to find that the eyes are completely covered by a tuft of long hairs, which droop from the base of the antennæ when the latter are directed backwards, and are themselves concealed beneath the wings in the protective attitude. When the moth is about to fly the antennæ are brought forward, and the same action raises the tufts and uncovers the eyes, so that both pairs of sense-organs are rendered efficient simultaneously. The base of the left antenna, with its tuft of hairs, is shown in Plate X., fig. 16, × 24·5. It is likely that the tufts may be of use in defending the eyes from dust, &c., as well as in preventing the brilliancy of these organs from interfering with the protective resemblance. Instances of an analogous arrangement, with the latter significance, are found in the gecko and the chamæleon, the strong protective resemblance being in these cases necessary for the capture of prey rather than the avoidance of enemies. The capture being largely dependent upon sight, the eyes are very large, and would tend to render these animals highly conspicuous. Hence in the gecko the pupil is (except in dim light) a narrow chink with very irregular margins, while all the rest of the exposed part of the eye is coloured in such a manner as to harmonise with the general surface of the animal, rendered inconspicuous by its strong resemblance to the stone which it frequents. In the chamæleon the arrangement is even more perfect, for the large eyes are covered with skin, except for a small aperture opposite the pupil, through which the animal can look. This skin is directly continuous with that of the rest of the body, and, like it, can be changed in tint so as to correspond with the colour of surrounding surfaces.

9. The comparatively late emergence of female moths from the pupa.—Every entomologist who has bred lepidopterous insects in the hope of pairing them in order to obtain eggs must have noticed that the great difficulty with which he has to contend is the fact that the males tend to emerge before the females. I have noticed this for several years, and in the case of all the species which I have employed in large numbers, and I know that others have had a similar experience. At first sight it would appear that this want of uniformity must be a disadvantage to the species, for large numbers of males must die before the females appear, and during the time when the latter are only beginning to emerge in small numbers. But, on the other hand, a more than compensating advantage is doubtless gained by the complete rivalry among a large number of males for each of the females as they emerge, so that in the majority of cases success in courtship is gained through the possession of qualities which are of advantage to the species, and not merely through the circumstance of emergence at an appropriate time.

10. The hereditary transmission of pink tubercles on the larvæ of Saturnia carpini. — The following notes I owe almost entirely to the kindness of my friend Dr. F. A. Dixey. On July 25th, 1885, eighty larvæ of this species were sent to Dr. Dixey from Norfolk, where they had been found feeding on meadow-sweet. The larvæ were mostly in the last stage, or the last but one, and after their arrival in Oxford they were fed upon willow. The ground colour of these in the last stage but one, whenever observed, was of a light bright green, but in the last stage it varied from this colour to a dull and dusky green. The black markings were also very variable in the last stage, being, as a rule, especially small in the bright green larvæ. In some larvæ the black rings were incomplete, and were occasionally reduced to a mere black line round each tubercle. The longitudinal black marks, as a rule, only occurred in the dull green larvæ. In seventy-six larvæ the tubercles were yellow, varying from orange to lemon-yellow, and the lighter tubercles were generally found upon the bright green larvæ. In three larvæ the tubercles were pink, without a trace of yellow or orange; in one the

tubercles were pure white. Of the three larvæ with pink tubercles, one was recognised from its size to be a female, and it was of a dull green colour, with the black markings largely developed. The other two were similarly recognised as males, and they were both of the brightest green colour, but with the black markings well developed (unusually so for so light a ground colour). The perfect insects emerged during the last ten days of April, 1886, and 120 eggs were obtained from the female moth which was developed from the larva with pink spots, the male parent being derived from one of the two pink-spotted larvæ just described. The larvæ emerged on May 23rd, 1886, and were fed upon hawthorn. During their first stages they showed a distinctly gregarious habit, and persistently sought the side of their glass cage, which was turned towards the light. Eighty of the larvæ were given to me, while the remainder were reared by Dr. Dixey. Of these forty, thirteen were found in the last stage to have yellow or orange tubercles, twenty-seven to have pink spots like the parents. The black segmental rings were not imperfect in any of the forty larvæ, as was so often the case in the original batch of larvæ. In this they completely resembled their parents. The green ground colour varied, but was mostly bright like that of the male parent. One larva spun a cocoon with apparently no valvular opening. Nearly all the larvæ had a diarrhœal discharge immediately before spinning, but this appeared to be entirely normal, and to be unconnected with any unhealthy condition. The eighty larvæ given to me were partially used for physiological investigations, but forty-eight became sufficiently advanced in the last stage to note the colours of the tubercles, which were found to be pink in thirty-seven larvæ. The results can therefore be tabulated as follows:—

1885. 80 larvæ, of which three (or 3·75 per cent.) possessed pink tubercles.

1886. 88 larvæ, of which 64 (or 72·7 per cent.) possessed pink tubercles.

It should be added that my larvæ were exposed to surroundings of different colours, but that the tubercles and the black markings were entirely unaffected, while the dullness or brightness of the green ground colour

certainly seemed to be influenced by dark or light surroundings. While the great majority of my larvæ possessed the uniformly developed well-marked black bands described by Dr. Dixey, in a few individuals these markings were present to a very slight degree.

11. Relation between phytophagous larvæ and various species of food-plant.—One of the most interesting things about insects is their extraordinary specialisation in relation to plants, and the complete interdependence between these widely separated groups of organisms. Not the least interesting feature of this relationship is the fact that so many species of phytophagous larvæ are rigidly limited to a few or often to only a single species of food-plant. If such larvæ are offered other food-plants it is well known that they will generally starve without touching them. And yet there can be no doubt that the food-plants must have been often extended or changed as the range of a species altered, and, although such change may be frequently in the direction of allied or representative species of plants, this is by no means always the case. Thus, taking a single instance, the common food-plants of *S. ocellatus* are sallow and apple, the occasional food-plants laurel and poplar. But if a larva becomes so specialised in relation to a food-plant that it will starve without touching another species there seems to be a great barrier in the way of any alteration, and the continued abundance of the animal would seem to be endangered by a double series of risks, *i. e.*, those which beset the animal itself, and those which beset the plant upon which it depends. Many observations, however, tend to prove that the rigid specialisation largely grows up in the life of each individual, and is therefore not inherent in the species. This seems to be shown by the following observations:—The larvæ of *S. populi* feed commonly upon poplar, rarely upon sallow and laurel: during the past season I offered laurel to some half-grown larvæ which had been previously fed upon *Populus nigra*, and, although left without other food for some days, the laurel was untouched. The larvæ similarly refused *Populus alba*. So also *S. ligustri* commonly feeds upon privet, lilac, and ash, but it has been occasionally found upon holly; and I have unsuccessfully offered the latter food-plant to

larvæ which had been previously fed upon privet, &c. The converse relation does not hold, for Mr. Grut informs me that a larva which he found upon holly ate privet with complete readiness. So also *S. ocellatus* found upon sallow will always eat apple, and *vice versâ*; but I feel sure that in either case it would starve without touching laurel or poplar. The last observation which has come under my notice is the most remarkable. In 1885 I found a company of half-grown larvæ of *P. bucephala* feeding upon hazel, and I offered them elm and *Salix triandra*, both of which were untouched; while they readily ate oak and *Salix cinerea* or *S. smithiana*. In this case elm is a very common food-plant of the species, perhaps the commonest at Oxford, where the larvæ were found.

It therefore seems certain that the young larva on hatching is in a far less specialised condition, as regards its food-plants, than that which it will subsequently reach. And this conclusion is supported by further direct evidence, for it is well known that young larvæ will nibble leaves of plants upon which the species has never been found, and may sometimes grow for a considerable time upon such food; while conversely the half-grown larvæ offered some new food do not usually give themselves the chance of becoming adapted to it, for as a rule they will starve without nibbling it in the least. There is not much difficulty in imagining the conditions under which a change of food-plant might occur without the most obvious cause, *i. e.*, alteration in range of distribution. The instinct of laying eggs is far stronger than that of laying them upon any particular species of plant, for it is well known that in confinement moths will lay eggs upon any surface which is at hand. Similarly a deformed female moth could not seek a scattered food-plant, but would be compelled to lay its eggs in a limited area. So also, in the case of rare plants, any larva wandering far before pupation would render it possible that the moth might not find the plant at all, and under these circumstances it could not wait beyond a certain period without laying its eggs; and the same facts would probably hold for the last eggs laid by many strong-flying species. Again, in certain cases it is possible that the female moth may have been deceived by the superficial resemblance between plants,

although, as a rule, the instinct is very accurate in this respect. Thus it has occurred to me that the remarkable association of sallow and apple, as the normal food-plants of *S. ocellatus*, may have been due to the considerable superficial resemblance between the wild crab (*Pyrus malus* var. *acerba*) and some of the broad-leaved sallows (such as *Salix caprea* or *S. cinerea*). There can be very little doubt after the above-described observations that holly is more recent as a food-plant of *S. ligustri*, and laurel in the case of *S. populi*, and such cases help us to understand how changes have occurred. The ready growth of a complete specialisation between such larvæ and their more ancestral food-plants, and the less complete specialisation to the more recent food-plants, is probably the direct result of the far greater age and frequency of the former relationship, so that in this case heredity works with instead of against the specialisation which grows up in the life of each individual. And probably, for the same reason, the change from one ancestral food-plant to another, or from a recent to an ancestral food-plant, when larvæ are half-grown, is rendered possible in those cases in which it has been proved to occur. But whether these suggestions be well founded or not, the main facts of this section must be held as established by observation,—that the newly-hatched larva is free to form special relations with occasional or rare food-plants which cannot be formed by the more mature larva in which such relations have already grown up towards a commoner food-plant. And this observation obviously goes a long way towards the explanation of those changes of food-plants which we know must have often occurred.

12. The origin of carnivorous habits in phytophagous larvæ.—Several observations make it probable that cannibalism or carnivorous habits tend to arise in larvæ, and have probably arisen in the past, out of the necessities which follow the scarcity of the normal food. During the summer of 1886 I was keeping large numbers of larvæ under conditions which rendered it probable that the food-supply would sometimes fall short. In order to investigate the colour-relation between larvæ and their surroundings, coloured glass cages and bags of coloured glazed lining were made use of; within these

coverings the condition of the food-plant could not be watched, and sometimes it withered, or was eaten earlier than I expected. Thus the larvæ were sometimes without food for a few days, and it was then found that *S. ocellatus* had lost their caudal horns, while in some cases the dorsal surface of the posterior part of the body had been also nibbled. This habit of nibbling off the caudal horns of other individuals is well known in this species and in *D. vinula*, but I do not think that it has been recognised as the result of hunger and as an obvious tendency towards cannibalism. This is proved by the fact that other lots of larvæ, always abundantly supplied with food, were either not injured at all or only in a very small proportion of cases. In one instance I kept some larvæ of *D. vinula* and *S. ocellatus* together in a blue cage, and on one occasion the food-plant had withered, and while it was being renewed I observed that a *D. vinula* was gnawing the thoracic leg of an *S. ocellatus*, and when the two were separated the former soon returned and seized one of the claspers in its mandibles, and bit it until it bled. Under similar circumstances I have found an almost full-grown larva of *A. betularia* which was engaged in swallowing a small larva of the same species. The small larva was held tightly in the clasp of the thoracic legs, and nearly half of it had disappeared when the observation was made.

These uniform results of the absence of food in all three species of purely phytophagous larvæ which have been placed under such circumstances seem to offer a probable explanation of those instances in which cannibalism is well known to occur.

13. The young larvæ of Vanessa urticæ and Saturnia carpini seek light.—Dr. Dixey informs me that his larvæ of *S. carpini*, when young, always assembled on the side of the cylinder which was turned towards the light, and I have made a similar observation in the case of the young larvæ of *V. urticæ*. In both cases rotation of the cylinders was followed by a corresponding change in the position of the larvæ. Both these larvæ are dark coloured when young, so that the observation, as far as it goes, supports Lord Walsingham's conclusions as to the advantage gained by the

absorption of radiant energy by larvæ. It would be well to test the theory by interposing a transparent athermanous screen between the larvæ and the source of light.

14. The movements of larvæ guided by an appreciation of the force of gravitation.—The following observation seems to admit of no escape from the conclusion that larvæ are guided by this sense, which must be of great importance to them when they have been blown off their food-plants, or have fallen after being disturbed. During the past summer I had great opportunities of observing the larvæ of *Vanessa urticæ*. It was necessary, for some experiments which I was then conducting, that the larvæ of the different companies should be kept apart, and accordingly they were placed in separate boxes. But a large company contains from 100 to 200 individuals, and it was found exceedingly difficult to put the last larvæ in the box without losing or injuring many others which had been previously captured, and which crawled up the side of the box and endeavoured to escape when the lid was removed. The explanation suggested in the title of this section then occurred to me, and I at once tested it by turning the box upside down in my pocket, when the larvæ immediately crowded to the bottom of the box, which was then uppermost. On another occasion I witnessed the practical use of this sense of direction in the case of the same species. While the individuals of a large company were being removed from a nettle-bed, about a dozen larvæ fell to the ground and escaped among the crowded leaves. Returning in the course of half an hour all the larvæ were found upon the tops of the nettles, having evidently commenced to reascend without any loss of time. Another instance of the same sense of direction is seen in the behaviour of larvæ (such as *Pygæra bucephala*) which have been blown off trees in the neighbourhood of walls and houses, for under such circumstances the larvæ obey the instinct to crawl upwards upon any adjacent surface, whatever it may happen to be, and they may often be seen patiently ascending some object which does not lead to their food-plant. But under natural conditions the larvæ are not equally liable to be misled by this sense of direction,

and under all circumstances it is controlled by that other sense which enables the larva to recognise its food-plant as soon as it reaches it.

Description of Plate X.

Fig. 1. Natural size. The mature larva of *Smerinthus ocellatus*, seen from the right side. The larva was found on *S. triandra*, and possessed the most developed system of red spots which I have yet seen. The figure shows that all three rows were highly developed, the upper row being represented on every segment anterior to the 8th abdominal; the middle row possessing in addition a spot upon the latter segment, while the lower row was quite complete, all the claspers being distinctly marked.

Fig. 2, × 2 diameters. The head of a mature larva of *Smerinthus populi*, seen from the right side. The patches of dark shading upon the head indicate the position of the red markings. The larva possessed a remarkably developed system of red spots, which extended on to the head itself in the positions shown in the figure. The chief masses are seen to be in the area of the ocelli, represented as a semicircle of black points, and on the apex of the head.

Fig. 3. Natural size, seen from the right side. An apparently mature Chærocampoid *Sphinx* larva, brought from Celebes by Dr. Hickson. The larva combines, in an interesting manner, the characteristics of many genera of *Sphingidæ*. The well-formed eye-like mark on the 1st abdominal segment, together with the correlated form of the anterior part of the body and the head, rendering possible the well-known terrifying attitude,—all are as in *Chærocampa*. The oblique stripes, with their dark borders, the traces of shagreening, and the subdorsal persistent for its whole length, especially resemble *Smerinthus* and the younger stages of *Sphinx*. The shape of the caudal horn is peculiar, but recalls that of the latter genus, while the fact that the shagreening is far more prominent upon this structure than upon any other part of the body also obtains in other genera, although it is perhaps most characteristic of *Acherontia*. The white dorsal and lateral spots are probably very ancestral features recognisable in the younger stages of *Sphinx* and *Smerinthus*. The living larva was green in colour.

Fig. 4. Natural size. A mature larva of *Amphidasis betularia*, seen from the left side. The figure represents a common green variety of this variable larva, and it is seen that in this, the usual attitude of rest, the larva is supported by holding a portion of the food-plant with its last pair of thoracic legs, instead of by the thread which is usually spun by the larvæ of *Geometræ* for this purpose.

Fig. 5. Natural size. The mature larva of *Rumia cratægata*, as seen from the right side attached to its food-plant—hawthorn—in the natural attitude of rest. The larva is recognised by the supporting thread, which, however, from its colour and fineness, does not attract attention in nature. The figure was drawn from an actual specimen of the larva on its food-plant, and it indicates the remarkable resemblance between the structural details of the animal and the plant upon which it most commonly occurs. The twigs resemble the larva in colour, in shape, and in direction. About in the middle of the majority of the twigs there is a prominent projection, which is almost exactly imitated by the dorsal tubercles of the larva; the processes form the crown of a very slight bend in both, while the ends of the twigs greatly resemble the head of the larva. Such a specialised protective resemblance would seem to be the product of a very prolonged association of the larva with this species of plant.

Fig. 6. Natural size. The mature larva of *Dicranura vinula* in the terrifying attitude, as seen from the left side. The larva had been irritated on the left side of its body, and, in obedience to the tactile stimulus, had assumed the attitude represented in the figure. In addition to the terrifying appearance being thus brought to bear upon the point from which the attack is made, the mouth of the gland secreting formic acid is also directed so that an enemy would probably be struck by the discharged fluid. The caudal flagella are represented as everted to their full extent, although the power of using these weapons is generally lost in the mature larvæ.

Fig. 7, × 2 diameters. The head and prothorax of a larva of *Dicranura vinula* towards the beginning of the last stage, looked at from below. At this stage of growth slight pressure applied to the larva causes the eversion of the gland-tubes which secrete the formic acid, and of the median sac in which the fluid is stored. There are seen to be four tubes, the anterior pair being longer and wider than the posterior pair. The position of the everted organs is seen to correspond with that of the horizontal slit-like mouth through which eversion takes place, and shown upon the red margin of the prothorax below the head in fig. 6.

Fig. 8, × 8 diameters. The left conical receptacle of the larva of *Dicranura vinula*, as seen from the left side, with its flagellum completely everted. Comparison with fig. 6 indicates that the flagellum curves towards the dorsal aspect of the larva. On the dorsal side of the base of the receptacle the anal flap is seen, and a tubercle (of which there are two) terminating in a bristle, and made use of in removing the fæces. The base of the flagellum is faintly coloured and transparent, so that the rest of the organ can be distinctly seen passing through this part during introversion. As introversion commences with the apex of the organ, the latter is seen to enter the transparent portion when the pink part is reduced to half its length. In the normal position of rest the transparent base is also introverted, and the deeply coloured part of the organ can be dimly seen lying in the semitransparent receptacle. The latter is covered with black patches, each of which bears a tubercle terminating in a bristle.

Fig. 9, × 188 diameters. The apex of the flagellum of the larva of *Dicranura vinula*, drawn so as to show the arrangement of its structural details. From the base up to the horizon A—A the superficial characters are shown; the cuticle, which appears smooth to the naked eye and with very low powers, is seen to be prolonged into very numerous fine sharp short processes (*c*); these are also seen in section above A—A, and they are shown to be processes of the superficial cuticular layer. Between A—A and B—B the hypodermis cells (*h. c.*) are seen from the surface, the cuticle having been removed. Above A—A the cuticle is seen in section around the rest of the structure, and it consists of the two normal layers, a superficial cuticular layer, which is non-laminated (*s. l. c.*), and a deep cuticular layer, which is finely laminated (*d. l. c.*) Both are quite transparent in this organ, although the former contains the black pigment in other parts of the larva. The whole of the pink pigment is contained in the flattened hypodermis cells (*h. c.*), and, as indicated in the drawing, it is darkest round the margins of the cells, and especially at their apices. Above B—B a longitudinal section along the middle line of the organ is shown; an oblique view of a transverse section of the structures beneath the cuticle, through half the organ, being represented immediately below B—B. The structures on the left side of the drawing are alone shaded in the longitudinal section. The hypodermis cells (*h. c.*) are seen to be flattened and to overlap each other. Beneath the cells is a delicate layer (B, *l.*) representing the thicker "dermal" connective tissues in many other parts. Beneath this there is a space filled with blood in the everted organ. Then follows the retractor muscle made up of

several bundles arranged round an axial space containing a large ganglion. The muscle bundles (*r. m.*) consist of striated fibres, and they are surrounded by a sheath (*m. s.*), which must be highly elastic. Occupying the axial space there is seen to be a ganglion made up of large ganglion cells (*g. c.*) and nerve-fibres (*n. f.*). The proportion of nervous to muscular tissue is seen to be very large.

Fig. 10, × 24·5 diameters. One of the eversible ventral glands of the larva of *Crœsus septentrionalis*, as seen in longitudinal section. The gland is represented as almost completely everted, the apex being still retracted. The layers are represented diagrammatically: (*s. l. c.*) = superficial non-laminated cuticular layer; (*d. l. c.*) = the deep laminated layer; (*h. c.*) = the hypodermis cells. The retractor muscle is shown at (*r. m.*); its fibres are striated.

Fig. 11, × 2 diameters. The head and four anterior segments of the larva of *Gonoptera libatrix*, as seen from the left side in the contracted state before pupation. The larva had been taken out of its cocoon. Two large black patches are very conspicuous on the second and third thoracic segments: no trace of these markings was present in the larva before the cocoon was spun. The line parallel with the dorsal contour of all segments except the anterior thoracic is the subdorsal, which was present in the younger larva, and still remains distinct. The black patches exactly cover the pupal wings which are developed beneath.

Fig. 12, × 10 diameters. A transverse section through the middle of the second thoracic segment of the larva of *Gonoptera libatrix*, showing the relation of the black patch indicated in the last figure to the developing pupal wings. Only the right half of the section is complete, the median line being indicated by the dotted line A—A. The digestive canal is indicated at (*d. c.*), the commissural strands of the ganglionic cord at (*n. c.*) The pupal cuticle is represented by (*p. c.*), and the larval cuticle by (*l. c.*) The pupal wing (*p. w.*) is seen to be developing as a pouch-like diverticulum of the body-cavity. The black patch (*b. p.*) is shown to be due to pigment in the superficial part of the larval cuticle; its extent is seen to correspond with that of the rudimentary wing beneath.

Fig. 13, × 188 diameters. A portion of the developing wing of the last figure, together with the larval cuticle which covers it, seen in transverse section. The larval cuticle consists of the two normal layers, of which the superficial one (*s'. l'. c'.*) is seen to contain the whole of the pigment of the black patch, while the lower lamellated layer (*d'. l'. c'.*) is coloured by staining reagents. This high magnification shows that the larval surface is rough,

although it appears perfectly smooth to the naked eye. Of course there are no hypodermis cells beneath the larval cuticle, for these structures have sunk to a lower level after forming the cuticle of the pupal wing, which now intervenes between them and the larval cuticle. These cells (*h. c.*) are extremely long and narrow when their whole length is shown in the section: their bases become attenuated and pass into fine fibre-like processes: their upper parts become continuous with an apparently homogeneous layer (*d. l. c.*), which represents the partially formed lower lamellated layer of the cuticle. Above this is the previously formed superficial layer (*s. l. c.*), which is ochreous in colour, but which quickly deepens into black on exposure to air when the larval skin is thrown off. This latter layer is seen to be much thicker and rougher than that of the larva.

Fig. 14. Natural size. The larva of *Paniscus cephalotes*, externally parasitic upon the larva of *Dicranura vinula*. The larva is seen from beneath, and it is of very exceptional size. The *D. vinula* larva was attacked by several of these parasites, of which all but one were destroyed, and the latter therefore appears to have attained the maximum size, for the host was not quite demolished.

Fig. 15. Natural size. The same larva, seen from the left side.

Fig. 16, × 24·5 diameters. The base of the left antenna of the imago of *Gonoptera libatrix*, as seen from the left side in the attitude of rest. In this attitude the main part of the antenna passes backwards beneath the wings, while a tuft of hairs rising from the base is brought over the eye of the moth, When the moth is disturbed the antennæ are brought forward, and the same action raises the tuft and uncovers the eyes. When at rest the brilliancy of the eyes is thus prevented from interfering with the very perfect protective resemblance to a dead leaf, and the eyes are also defended from dust, &c., especially during the prolonged rest of hybernation, which in this species takes place in the imaginal stage.

XV. *On* Byrsops, *and some allied genera.* By Francis P. Pascoe, F.L.S., &c.

[Read June 1st, 1887.]

Plate XI.

Only one species of *Byrsops** has, I believe, been described since 1842, when Schönherr enumerated twenty-five. I have now in the following pages described fourteen, which I have not been able to identify with any of his descriptions. To these I have added a few others, chiefly new generic forms, belonging to the same subfamily.

With Lacordaire's "*Byrsopsides vrais*" I place *Synthocus*, it having the same prothoracic canal as *Byrsops*. These and the other genera of this section of *Byrsopinæ* may be better understood by the following table :—

Intermediate coxæ contiguous.
- Prothorax spined at the sides .. .. Hoplitotrachelus, *Schön.*
- Prothorax not spined.
  - Tarsi elongate .. .. Byrsops, *Schön.*
  - Tarsi not elongate.
    - Funicle six-jointed .. .. .. Dyerocera.
    - Funicle seven-jointed.
      - Club adnate .. .. Daulaxius.
      - Club not adnate.
        - First abdominal segment distinct Ixodicus, *Pasc.*
        - First abdominal segment combined with the second .. .. .. Liasotus.

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* The genus was first distinguished by Schönherr in 1826 under the name of *Cryptops* (Curc. Disp. Meth., p. 65); previous writers —Thunberg, Wiedemann, &c.—had confounded it with *Brachycerus*. Schönherr subsequently changed the name to *Byrsops*. He spoke of its species being from the Cape and Bengal, but as it is exclusively South African, it would be interesting to know what were the insects he mistook for *Byrsops*. They were in Westermann's collection at Copenhagen.

Intermediate coxæ not contiguous.
  Metasternum pointed anteriorly.
    Scrobes curving beneath the eye . .. SYNTHOCUS, *Schön.*
    Scrobes straight in front of the eye.
      Pectoral canal narrow, deep .. .. OPHRYODOTUS.
      Pectoral canal broad, shallow .. .. PEZERPES.
  Metasternum broad and truncate anteriorly .. EURYXENA.

The following is a list of the species described in this paper:—

Byrsops socia.
,, *plumbea.*
,, *scapularis.*
,, *mendica.*
,, *alveata.*
,, *intermedia.*
,, *glaucescens.*
,, *terrena.*
,, *encausta.*
,, *vittigera.*
Byrsops vicaria.
,, *tersula.*
,, *eximia.*
,, *farinosa.*
Daulaxius stolatus.
Dyerocera gravida.
Liasotus ovis.
Ophryodotus singularis.
Pezerpes rugosus.
Euryxena bruchoides.
Spartecerus infaustus (accidentally figured).

1. Edge of declivity* rounded.

Byrsops socia.

B. subovata, squamositate subsilacea nitida tecta; rostro sat elongato, basi angustiore, leviter reticulatim foveato; prothorace angustato, ante medium incurvato, antice late sulcato; elytris oblongo-quadratis, triseriatim tuberculatis, dorso fere in medio et juxta basin macula communi umbrina notatis. Long. 4 lin.

Hab. S. Africa.

Subovate, covered with a somewhat glossy greyish yellow squamosity;† head rather narrow, superciliary ridges strongly raised; rostrum rather long, narrowed at the base, slightly reticulately pitted in front; prothorax rather longer than broad, incurved at the sides to the middle and thence rounded to the base, coarsely pitted, the apex with a larger pit or groove; elytra oblong-quadrate, much broader than the prothorax at the base, each with three rows of mammilliform tubercles, the inner one commencing behind

* In the *Byrsopinæ* the elytra are generally suddenly bent down or truncate behind, the vertical portion constituting the "declivity." Our genus *Gronops* is an exception.

† What is by some entomologists called a "squamosity" is intended to represent the *modern* Latin "indumentum," for which our language has no equivalent. In reality squamosity is nothing more than very minute scales, never overlapping, and not always contiguous.

the middle, of seven tubercles, each gradually smaller to the apex, the second of seven, including one at the base nearer the suture, the outer row of eight, the last three much the smallest, the interstices rather closely and coarsely punctured, at the base a common bilobed and just before the middle a quadrate spot composed of short erect umber hairs; legs dotted with long white setæ.

Allied to *B. buccellaria* (the type of the genus), but, *inter alia*, with a narrower head and prothorax, the latter longer than broad, and the elytra quadrate, with the tubercles mammilliform.

Byrsops plumbea. (Pl. XI., fig. 7).

B. ovata, nigra, squamis minutis albidis confertim vestita, ad latera elytrorum maculis plurimis niveis ornata; rostro breve, angusto, subgibboso, impunctato; elytris latis, modice convexis, minus tuberculatis. Long. 3½ lin.

Hab. Cape.

Ovate, black, clothed above with minute, whitish, non-contiguous scales; head broad, convex in front, and with low superciliary ridges; rostrum short, narrow, gibbous in the middle, and without grooves or punctures; club of the antennæ stout, and as long as the funicle; prothorax transverse, very slightly rounded at the apex, the disc irregular, dotted with a few glossy black granules; scutellum transverse, covered with ferruginous hairs; elytra in the middle nearly twice as broad as the prothorax, with numerous shallow punctures placed in irregular lines, each elytron with two rows of tubercles, the inner with three, the middle with five, and the outer with seven, the latter with the tubercles compressed and continuous, between the outer and close to the middle row a black stripe, the deflexed sides with well-limited spots composed of snowy scales; body beneath blackish, suture between the two basal segments of the abdomen nearly obsolete; legs covered with whitish scales, and dotted with longish setæ.

The black derm just visible between the white scales, which are also present in the punctures, especially on the elytra, gives a leaden hue to this species. The spots on the sides are probably liable to unite.

Byrsops scapularis.

B. late subovata, indumento, vel squamis minutis, subnitide griseis dense tecta; rostro crasso, leviter foveato; prothorace rude

foveato, in medio subsulcato; elytris subquadratis, prothorace fere duplo latioribus, tuberculis conicis numerosis triseriatim dispositis, unum humerale majus. Long. 4 lin.

Hab. Cape.

Broadly subovate, covered with a slightly glossy greyish squamosity, or with minute scales; head broad, over each eye an angular superciliary ridge; rostrum short, four rows of shallow pits posteriorly; funicle rather short, slender; prothorax broad and rounded at the sides, convex, and roughly pitted above, the middle with a shallow groove, and a few glossy black granules, more or less united on the deflected sides; elytra subquadrate, much broader at the base than the prothorax, the sides subparallel, each elytron with three rows of mostly mammilliform contiguous tubercles, the inner row towards the base of a few oblong slightly raised tubercles or merely a raised line, the intermediate and outer rows commencing near the base, the largest tubercle at the shoulder, the intervals irregularly and closely pitted, the deflected sides with mostly very large and approximate pits, the declivity with a row of smaller tubercles, a continuation of the inner row; body beneath with a dull greyish squamosity, second abdominal segment marked off from the first by a very distinct suture; legs with whitish scales and dotted with black setæ.

Compared with *B. buccellaria* this species has contiguous and larger tubercles, coarser foveæ, and on the shoulders a rounded and prominent callus-like tubercle.

Byrsops mendica.

B. ovata; squamositate obscure grisea sat laxe tecta; rostro subangusto, ruguloso; prothorace antice constricto, postice convexo, apicem versus profunde trifoveato; elytris breviter ovatis, triseriatim tuberculatis, tuberculis magnis; tarsis crassiusculis. Long. $2\frac{2}{3}$ lin.

Hab. Cape.

Ovate; rather thinly covered with a dull greyish squamosity; head broad, superciliary ridges raised; rostrum somewhat narrow, scarcely longer than the head, roughish, dotted with a few short setæ; prothorax not longer than broad, indistinctly tuberculate, constricted anteriorly, and markably convex behind, near the apex three deep foveæ, and at the base two short raised tuberculiform lines; elytra shortly ovate, each with three lines of mostly stout approximate tubercles, the outer row with a larger tubercle at the shoulder followed by six gradually smaller ones, except the last,

intermediate row of five gradually larger tubercles towards the declivity, inner row of two large tubercles continuous with three small ones on the declivity, itself forming with its fellow a shallow groove, the interstices finely punctured; beneath and legs roughly squamose, setigerous; tarsi stout.

This species may be placed after *B. Hopei*, but it is much smaller, with narrower rostrum, the inner row of tubercles confined to the edge of the declivity, &c.

Byrsops alveata.

B. subovata, squamositate grisea dense tecta; rostro antice bisulcato; prothorace in medio carinis angustis altis duabus munito; elytris breviter ovatis, tuberculis majusculis triseriatim dispositis. Long. 4 lin.

Hab. Cape.

Subovate, densely covered with a greyish squamosity; superciliary ridges semicircular; rostrum longer than the head, with three stout ridges forming two deep grooves between them, the outer ridge joined to the superciliary ridge; prothorax subcylindrical, four-ridged, the two middle ridges linear and raised, forming a narrow groove between them, the lateral ridges interrupted, the interspaces more or less excavated; elytra shortly ovate, each with three rows of tubercles, the outer row of six large oval ones, the intermediate row of four, two only before the declivity, the inner of four, all the tubercles more or less contiguous at the base, and coarsely pitted between the rows, at the base near the suture an oval patch of brown closely-set hairs; legs dotted with slender black setæ; tarsi rather long.

The sculpture of the rostrum and prothorax and the larger tubercles on the elytra at once distinguishes this species. It may be placed after *B. lutosa*.

Byrsops intermedia.

B. ovata, squamositate saturate grisea sat tenuiter tecta; rostro longiore, pauci-foveato; prothorace subcylindrico, in medio leviter sulcato, antice utrinque late excavato; elytris ovatis, triseriatim tuberculatis, tuberculis majusculis, approximatis vel subapproximatis, basi singulorum macula silacea notatis. Long. 4 lin.

Hab. Cape.

Ovate, dark grey, with a pale slightly interrupted squamosity; superciliary ridges raised, a smaller ridge bounding the base of the

rostrum, this longer than the head, flattish in front, with about eight foveæ; prothorax subcylindrical, broadly grooved in the middle, with a large fovea on each side anteriorly, rest of the prothorax and sides sparsely and finely punctured; elytra ovate, each with three rows of tubercles, these rather large, mostly conical, more or less approximate, and confined to the edge of the declivity, the inner row of six, the first tubercle connected with an elevated ridge extended from the base, the second row of six large tubercles, the first oblong and out of the line of the remainder, third row of eight tubercles, interspaces moderately punctured; abdomen with a few coarse punctures; legs with many short setæ; tarsi rather stout.

This species may be placed near *B. buccellaria*, but it has no central spot on the elytra, and it has much broader tarsi.

Byrsops terrena.

B. ovata, squamositate sordide grisea tecta; rostro brevi, crassiusculo, pauci-foveato; prothorace sat valde transverso, disco granulis parvis nitide nigris adspersis; elytris sat breviter ovatis, singulis carinis tuberculatis tribus munitis. Long. 4 lin.

Hab. South Africa.

Ovate, uniformly covered with an opaque earthy greyish squamosity; head broad, superciliary ridges scarcely raised; rostrum thickish, shorter than the head, convex, and with few foveæ in front; prothorax much broader than long, with remote lines, each consisting of a few small glossy black granules; elytra rather shortly ovate, each with three slightly raised lines dotted with small mammilliform non-approximate tubercles, nearly obsolete on the declivity, the interstices finely punctured; body beneath with a roughish squamosity, that on the legs of a silvery hue; tibiæ and tarsi dotted with many black setæ.

Allied to *B. rana*, but larger, broader, the elytra more tuberculate, only slightly punctured, and the prothorax without the white spot at the side.

Byrsops glaucescens.

B. ovata, squamositate griseo-alba tecta; fronte carinula obliqua instructa; rostro antice pauci-foveato, basi tuberculo ovali instructo; prothorace cylindrico, basin versus tuberculis quatuor setigeris utrinque dispositis; elytris breviter ovatis, dorso etuberculatis; tarsis latis. Long. $2\frac{3}{4}$ lin.

Hab. S. Africa.

Ovate, covered with a greyish-white squamosity (to the naked eye having a glaucous tint), and with a few minute black setæ above; superciliary ridges raised, front with two lesser oblique ridges bounding the base of the rostrum, this of moderate length, marked with four foveæ in front, the base with an oval tubercle; prothorax cylindrical, rather longer than broad, anteriorly with three large concavities, posteriorly two lines, each of four setigerous tubercles, having a short groove between them; elytra shortly ovate, each with three rows of tubercles, the inner row of one tubercle only posteriorly and three on the declivity, the second row with four, including one at the declivity and two at the apex, the outer or lateral row with five, at the base two raised lines, rest of the elytra obsoletely punctured except the line near the suture, at the commencement of the declivity a black curved transverse line; body beneath and legs with a dense squamosity; tarsi dilated.

The broad tarsi—an exception to the characters of the genus—and the disk of the elytra non-tuberculate, with the well-defined black apical line, will at once distinguish this pretty little species.

2. Edge of the declivity angulate.

Byrsops encausta. (Pl. XI., fig. 6).

B. oblonga, squamis minutis argenteo-griseis tecta; capite antice convexo; rostro integro, leviter foveato; prothorax trisulcato; elytris plaga communi basali, apice posticeque bifida, fusco-hirsuta notatis, postice tuberculatis; tarsis elongatis. Long. 4½ lin.

Hab. South Africa.

Oblong, the elytra especially covered with minute silvery grey scales, those on the head and prothorax more decidedly grey; head convex in front, a curved shallow depression marking it off from the rostrum, this stoutish, entire, and indistinctly pitted; prothorax nearly parallel at the sides, irregularly pitted, the three largest pits anteriorly, the middle one forming part of a longitudinal groove; elytra much broader than the prothorax, but not at the base, each with a row of four or five small tubercles at the side of the disc and another row of large tubercles on the inflexed side, between these a brown stripe varying in certain lights, posteriorly near the suture two small tubercles, the declivity also with tubercles, the largest near the angle, a large oblong dark brown patch, composed of erect hairs, but not extending to the

declivity, and its two extremities bifid; legs dotted with slender black setæ; tarsi slender; suture between the two basal segments of the abdomen marked by a row of larger punctures.

The stripes or patches on the elytra of this and neighbouring species are made up of short erect closely-set hairs—a modification of scales.

Byrsops vittigera. (Pl. XI., fig. 4).

B. oblongo-ovata, squamis minutis griseo-albis tecta; rostro angusto, integro, antice sex-foveato; elytris lineis vittis duabus abbreviatis umbrino-notatis, postice tuberculatis; tarsis elongatis. Long. 4 lin.

Hab. Cape.

Head in front broadly convex, superciliary ridges nearly obsolete; rostrum with a double row of six foveæ on the basal half; prothorax rather longer than broad, slightly rounded at the sides, irregularly and unequally pitted, anteriorly three deeper and larger pits, and at the base an oblong depression; elytra broader than the prothorax, each with three raised lines on the disc, and a fourth on the deflected side, the inner and third short, the intermediate towards the declivity developing into three narrow and gradually larger tubercles, on the declivity a smaller and more conical tubercle, between the lines and at the deflected sides rows of punctures extending to the apex, on each side of the suture an umber-coloured stripe, not extending to the declivity, composed of erect hairs, and followed by two tubercles; legs dotted with black setæ; tarsi long and linear.

Possibly an ally of *B. retusus*, described by Boheman from a specimen without head and legs. The tarsi are unusually long and slender.

Byrsops vicaria.

B. oblonga, subtilissime granulata, squamis minutis griseis tecta; rostro crassiusculo, integro, antice obsolete foveato; elytris vitta communi basali fusca notatis, postice tuberculatis; tarsis elongatis. Long. 3 lin.

Hab. Cape.

Allied to the last but narrower, with only one stripe on the disc of the elytra, and the upper surface dotted with very small glossy black granules; head and rostrum as in the last, but the latter shorter and stouter; prothorax broader and very slightly pitted, except the three anterior pits, which are just as strongly marked;

elytra with the outer line on the disc well developed, the tubercles more mammilliform, the deflected sides only striate-punctate, the interstices raised; legs dotted with black setæ; tarsi not so slender; faint trace of a suture between the first and second abdominal segments.

Byrsops tersula. (Pl. XI., fig. 8).

B. oblonga, griseo-squamosa fusco varia; rostro basi sex-punctato; prothorace antice transversim constricto; elytris tuberculis magnis triseriatim instructis, interstitiis fuscis seriatim punctatis. Long. 3 lin.

Hab. South Africa.

Oblong, covered with minute greyish and brownish scales; head broad, a small round superciliary ridge, front irregularly punctured; rostrum narrow, with a double row of six punctures at the base; prothorax convex, rounded at the sides, and about as long as broad, the apex slightly produced with a transverse impression behind it, the disc roughly punctured in the middle, punctures at its sides smaller and less approximate, the sides and middle striped with brown; elytra not twice the length of the prothorax, disc seriate-punctate, each with three rows of tubercles, all conical and gradually larger to the proclivity, the interval between the first and second rows with a double row of punctures, the inner and outer rows with three tubercles each, the intermediate with five, the last of this row much the largest, on the declivity one mammilliform and two or three smaller tubercles, the deflexed sides with numerous scattered punctures; first abdominal suture nearly obsolete; legs dotted with long setæ or hairs.

The intervals between the rows of tubercles have a brownish hue, but the outer stripe is dark brown. A pretty little species slightly resembling *B. vittigera.*

Byrsops eximia. (Pl. XI., fig. 5).

B. oblonga, subparallela, squamis minutis roseo-griseis vestita, linea lanceolata suturali, postice abbreviata, fusca ornata, discoque ad latera fusca; rostro carinis tribus abbreviatis instructo. Long. 5½ lin.

Hab. Cape.

Narrowly oblong, the side nearly parallel, clothed with very minute rose-grey scales; head broad, superciliary ridges well developed: rostrum constricted at the base, in front three carinæ,

but not extending to the apex; antennæ black; scape thick; funicle linear, slender, the two basal joints elongate; club large, ovate; prothorax oblong, grooved in the middle, irregularly punctured, and three oblong depressions anteriorly; elytra slightly broader in the middle than at the base, unequally and nearly obsoletely seriate-punctate, disc on each side with a row of small tubercles terminating at the declivity in a large tubercle, and a smaller one nearer the suture, sides of the disc obliquely inflexed and dark brown, on the suture, but extending to the declivity, a dark chocolate-brown lanceolate stripe composed of densely packed erect short hairs, the declivity itself clouded with brown, with one larger and four smaller tubercles on each side of the suture; body beneath and legs pale ferruginous, the latter elongate and dotted with numerous long black setæ.

I have a specimen—agreeing with another in the British Museum—labelled *B. amplexicollis*, Wiedm., to which this species is closely allied, but it does not agree with Boheman's description (Schönherr, vi., 2, p. 390); indeed, if the character of the tarsi is correct ("tarsis subtus dense nigro-pilosis") it can hardly belong to the genus.

Byrsops farinosa.

B. oblonga, silacea, squamis minutis albidis tecta; rostro longiusculo, gibboso, obsolete punctato; prothorace convexo, vix punctato; elytris supra planatis, ad latera modice rotundatis, lineatim leviter punctatis, postice tuberculis parvis marginatis. Long. 5½ lin.

Hab. South Africa.

Oblong, pale brownish yellow clothed with minute whitish scales; head broadly concave between the two elevated superciliary ridges; rostrum rather longer, narrowed at the base, gibbous, obsoletely punctured; antennæ small, the funicle gradually stouter to the club; prothorax convex, rather longer than broad, constricted anteriorly, scarcely punctured; elytra moderately rounded at the sides, abruptly declivous behind, the disc flat, with very small punctures in lines, the deflexed sides with broad rather shallow grooves, and covered with brownish yellow scales, the disc at the declivity margined with above a dozen small round tubercles, and about the same number, but much smaller, at the side; body beneath rusty-brown, legs mottled with the same colour, and dotted with small black setæ; tarsi with the claw-joint cylindrical and longer than the others together.

To the naked eye a pale fawn-coloured species with scarcely any punctuation, and with only very small marginal tubercles.

Daulaxius.

Caput depressum; rostrum subangustum; scrobes breves, obliquæ. Antennæ breviusculæ; funiculus septem articulatus, articulo ultimo ad clavam arcte applicato. Elytra convexa, ampliata. Rima pectoralis profunda. Pedes validi; tarsi breves incrassati.

The last joint of the funicle intimately with, and indeed forming part of, the club, and the thick tarsi, are the principal technical characters of this new genus, differentiating it from *Byrsops*. The facies is that of a *Brachycerus*. It may be noticed that the light-coloured scales are linear or lanceolate, with a deep median groove, those on the tibiæ standing well out from the surface; the darker scales are smaller, many of them having a small central puncture.

Daulaxius stolatus. (Pl. XI., fig. 11).

D. validus, squamis fulvo-griseis dense tectus, disco prothoracis elytrisque basi et fere in medio fascia lata abbreviata nigro-fusca notatis. Long. 5 lin.

Hab. Delagoa Bay.

Broadly ovate, closely covered with fulvous-grey scales, the disc of the prothorax and a large ⊥-shaped patch on the base of the elytra dark brown; head irregularly excavated between the two well-developed superciliary ridges; basal half of the rostrum roughly punctured; basal joint of the funicle pyriform; club oblong, pointed; prothorax scarcely broader than long, narrower at the apex, the sides rounded, disc with rough irregular tubercles, but having a marked interrupted groove in the middle; elytra at the sides more than twice as broad as the prothorax at the base, not suddenly declivous posteriorly, each elytron with three rows of tubercles, the two inner not continued beyond the declivity, the outer row bounding the disc of about ten contiguous tubercles, at the shoulder a short row of three, all closely covered with scales; three intermediate segments of the abdomen of equal length; legs closely covered with greyish scales, and dotted with black setæ; three basal joints of the tarsi very short and broad.

DYEROCERA.

Rostrum crassum, difforme; scrobes transversæ, ab oculos distantes. Antennæ validæ; scapus brevis; funiculus sex-articulatus, articulis totis transversis ad clavam gradatim latioribus. Prothorax elevatus, apice truncatus, lobis ocularibus ciliatis. Elytra convexa, ampliata. Tibiæ apice extus productæ; tarsi angustati. Rima pectoralis obsoleta.

This genus would perhaps be better placed in the *Brachycerinæ*, as the antennæ are only partially geniculate, and the mandibles, so far as I can make out, are covered by the mentum; but the six-jointed funicle, the large ocular lobes, and the depression, hardly amounting to a canal, in front of the anterior coxæ, have decided me, at any rate provisionally, to refer it to the *Byrsopinæ*. In the exponent of this genus the sculpture of the head and rostrum is very complex; on the elytra there are a number of large and small tubercles, apparently arranged in a row, but under a Codington they are seen to be very much mixed.

Dyerocera gravida. (Pl. XI., fig. 9).

D. breviter ovata, squamis minutis cinereis vestita; prothorace confuse granulata; elytris globosis, quasi seriatim tuberculatis. Long. 4 lin.

Hab. Transvaal.

Shortly ovate, black, shining, not closely covered with minute ashy scales; head moderately broad; eyes large, a ridge over each, between them a Y-shaped glossy black raised mark; rostrum short, arched, the basal half with a glossy black median ridge with two or three tubercles at the sides, anteriorly a well-marked groove, the apex on each side with a porrect cylindrical process; antennæ blackish, the first joint of the funicle scarcely as long as broad; the club shortly ovate, pointed, and clearly marked off from, although closely contiguous to, the last joint of the funicle; prothorax very transverse, the sides expanded and tuberculate, the disc clouded with about nine irregular glossy tubercles, a row of smaller ones at the base; elytra globose, the base lower than the prothorax at its junction, covered above with irregular rows of tubercles, several of the smaller more or less granuliform, the larger more or less semicircular at the top, the cavity behind filled with minute hairs, the spaces between the tubercles unequally and more or less deeply pitted, sutural row raised at the base; abdomen

closely embraced by the elytra, the three intermediate segments of equal length; legs dotted with long white setæ; last tarsal joint nearly as long as the three preceding together.

Liasotus.

Caput latum; rostrum breve; scrobes arcuatæ. Antennæ breves; funiculus articulo basali longiusculo, cæteris valde transversis; clava distincta. Prothorax ad latera rotundatus. Elytra ovata. Tibiæ apice intus spinosæ; tarsi breves, validi. Abdomen segmentis duobus basalibus conjunctis.

The only exponent of this genus has the facies of certain *Sparteceri*, but the contiguity of the intermediate coxæ requires it, according to Lacordaire's arrangement, to be placed among his "*Byrsopsides vrais*." The union of the two basal segments of the abdomen is probably not a reliable generic character, as it occurs in some species of *Byrsops*. There appears to be a small triangular scutellum hardly to be distinguished from the elytra.

Liasotus oris. (Pl. XI., fig. 10).

L. oblongo-ovatus, squamositate grisea omnino dense tectus, supra foveis determinatis impressus; elytris postice tuberculatis. Long. 5 lin.

Hab. Natal.

Oblong ovate, everywhere closely covered with a pure grey squamosity, except a dark spot on each elytron at the base; head very broad, and having two slight depressions between the eyes; rostrum as broad as long, a single tubercle at the base, and sparsely punctured; antennæ with a short robust scape; first joint of the funicle rather longer than broad, the rest very transverse and of equal breadth throughout; club ovate, pointed, black; prothorax slightly transverse, narrowly bilobed at the apex, deeply pitted on the disc, less so at the sides; elytra shortly ovate, the sides broad and inflexed, irregularly and closely pitted, the intervals, except at the base, more or less tuberculate, tubercles in three lines on each elytron, the outer lines of seven tubercles extending from the shoulder to the apex, the intermediate line of four and the interior of three, the larger tubercles conical, each having a minute black seta arising just below its apex behind; abdomen slightly punctured.

Ophryodotus.

Rostrum modice elongatum, basi angustius; scrobes supra oculos currentes. Antennæ graciles; articulus basalis funiculo quam cæteris simul sumpti paulo longior. Prothorax angustus. Elytra triangularia postice modice declivia. Pectus excavatum. Coxæ intermediæ separatæ. Abdomen segmento basali ampliato. Pedes mediocres; tibiæ rectæ, intermediæ et posteriores apice extus tri- quadri-spinosæ.

The scrobe passing above the eye is, so far as I know, a character unique. The great length comparatively of the basal joint of the funicle is quite exceptional in this group, and throughout the family it is rarely met with. The corbels of the posterior tibiæ are only slightly cavernous, while the apex externally is furnished with four short stiff spines, the intermediate tibiæ having only three.

Ophryodotus singularis. (Pl. XI., fig. 2).

O. oblongus, omnino griseo-squamosus; caput supra oculum utrinque tuberculum magnum obsitum; rostrum in medio sulcatum; prothorax ad latera tuberculatus, disco lineis duabus alte elevatis tuberculatis instructo; elytra seriatim tuberculata, tuberculi valde inæquali; tarsi breviusculi. Long. 3 lin.

Hab. South Africa.

A small spinose species with an unusually narrow prothorax. Head convex above, a large triangular tubercle above each eye, the deep hollow between them continuous with the groove on the rostrum; antennæ pale ferruginous, tomentose, the club distinct, large, ovate; prothorax narrow throughout, prolonged over the head, lobes moderate ocular, on each side a row of three spines, and with two strongly raised lines on the disc crowned with irregular spiniform tubercles, the space between the lines forming a deep groove having a slightly raised line, punctured on each side, in the middle; scutellum punctiform, covered with a white tomentum; elytra at the base slightly sloping away to the shoulders, where it is about three times broader than the prothorax, thence gradually narrowing to the apex and terminating in two conical slightly diverging tubercles, seriate-punctate, the interstices raised, the third and sixth forming two strongly elevated lines, each crowned with a row of mostly large more or less conical tubercles, the inner row only continued to the apex; body beneath with scattered punctures partly concealed by scales:

femora slightly thickened in the middle; tarsi with a few long black setæ.

Pezerpes.

Rostrum difforme; scrobes laterales, ad partem anteriorem oculi attingentes; scapus antennarum valde clavatus; funiculus articulo basali elongato; clava magna; prothorax oblongus; elytra prothorace latiora; pectus antice excavatum; abdomen segmentis duobus basalibus ampliatis, sutura invisa; coxæ anticæ separatæ; femora tibiæque incrassatæ; tarsi exigui; sutura prima abdominis invisa.

In technical characters this genus comes very near *Synthocus*, although very different in facies, but the scrobe not passing beneath the eye at once distinguishes it. The smallness of the tarsi and the stout femora and tibiæ are very noticeable. The first and second abdominal segments show no trace of a suture between them.

Pezerpes rugosus. (Pl. XI., fig. 3).

P. angustus, oblongus, supra nodosus et tuberculatus, tomento griseo tectus; caput supra oculos tuberculis duobus validis instructum; prothorax profunde sulcatus; elytra subseriatim tuberculata, apice late rotundata. Long. 2 lin.

Hab. South Africa.

A small narrowly oblong species covered with a pale brownish tomentum, knotted and tuberculate above. Head with two large elevated tubercles above the eyes; rostrum gibbous, deeply grooved in the middle; antennæ testaceous, basal joint of the funicle not so long as the rest together; club stout, ovate; prothorax longer than broad, two elevated lines crowned with tubercles in the middle, with a deep groove between them, a large and a smaller tubercle on each side; elytra nearly twice as broad as the prothorax, broadly rounded at the apex, each with four unequal rows of tubercles, the tubercles mostly cylindrical, the largest posterior, between them closely punctured; femora and tibiæ closely covered with a greyish tomentum; tarsi ferruginous, naked.

Euryxena.

Rostrum mediocre. Antennæ breves, articulo basali funiculi crassiore. Prothorax transversus. Elytra brevia, planata, postice abrupta declivia. Pectus profunde excavatum. Mesosternum latum, antice truncatum. Pedes mediocres; femora paulo incrassata; tibiæ intus apice calcaratæ; tarsi graciles.

This genus is at once differentiated from *Synthocus* by its intermediate coxæ separated by a broad and truncate mesosternum, and tibiæ sharply spurred at the apex. The genus represented by a remarkable form with very broad elytra, abruptly declivous posteriorly.

Euryxena bruchoides. (Pl. XI., fig. 1).

E. latissime ovata, grisescens; prothorax cum capite squamositate griso-fulva sat dense tectus, hic tuberculato-marginatus; elytra latissima, supra planata, singulo linea flexuosa elevata munito; corpus infra pedesque squamositate grisea tecti. Long. 2½ lin.

Hab. Cape.

Head and prothorax covered with a greyish-fulvous squamosity, but darker and thinner on the elytra; front of the head flattish, between the eyes two small approximate tubercles; rostrum longer than the head, transversely gibbous behind the middle; prothorax short, gradually rounded from the apex to the base, the disc very irregular and tuberculate, tubercles round the margin contiguous, each tipped with a black seta, tubercles in the middle and base fewer; no scutellum; elytra broader than long, flat above, each with a raised flexuous line, the suture with a finer raised line not continued to the declivity, the sides and shoulders tuberculate, at the base and away from the suture a mammilliform lobe projecting slightly over the prothorax, the declivity with two rows of small tubercles; basal segment of the abdomen as long as the three next together.

Spartecerus infaustus. (Pl. XI., fig. 12).

S. oblongo-ovatus, niger, fere esquamosus, supra confertim rugoso-tuberculatus; rostro antice elevato, grosse tuberculato, a capite profundissime separato; elytris ovatis, modice convexis. Long. 5 lin.

Hab. Transvaal.

Oblong ovate, black, nearly scaleless, above closely covered with coarse but delicately granulate tubercles; head rounded, but with a slight depression in front and a short ridge over each eye; rostrum much broader at the apex, considerably raised above the head at the base, from which it is marked off by a very deep fissure; basal joint of the funicle scarcely stouter than the second; prothorax moderately transverse, rounded at the sides, tubercles flattish, more or less coalescing, anteriorly a transverse groove

between them; scutellum very small; elytra moderately convex, rounded at the apex, tubercles varying in size, arranged in irregular rows with unequal depressions between them, the third row raised on the declivity; body beneath, tibiæ and tarsi closely clothed with a rusty scurf; second abdominal segment as long as the next two together, and separated from the first by a curved suture.

Compared to the type, *S. angulatus*, this is an aberrant form, and will by-and-bye, no doubt, be raised to generic rank; another member probably of the "Pseudo" or "Para" nomenclature.

Explanation of Plate XI.

Fig. 1. *Euryxena bruchoides*; sterna and coxæ.
2. *Ophryodotus singularis*; side view of the head.
3. *Pezerpes rugosus*; side view of the head.
4. *Byrsops vittigera*; antenna.
5. ,, *eximia.*
6. ,, *encausta*; fore tarsus and part of tibia.
7. ,, *plumbea.*
8. ,, *tersula.*
9. *Dyeroccra gravida*; side view of the head.
10. *Liasotus ovis*; front view of the head and rostrum.
11. *Daulaxius stolatus*; side view of the head.
12. *Sparteccrus infaustus*; side view of the head.

XVI. *Contributions to a knowledge of Oriental* Rhynchota. Part. I. Fam. Pentatomidæ. By W. L. Distant.

[Read September 7th, 1887.]

Plate XII.

Mr. E. T. Atkinson, now of Calcutta, has recently published a list of all the described species of Indian Homoptera, and is preparing to extend his labours to the Heteroptera. He submitted a number of species to me for determination, several of which I found to be nondescript, and therefore necessary to be described. I also recognised in my own collection many undescribed species from the Oriental Region, which had accumulated during the last few years, whilst my attention had been engrossed by another order of insects. It thus becomes necessary to make these species known, in order that Mr. Atkinson's list shall be as complete as possible, the object of that list being to assist, or rather to promote, the study of the Rhynchota in India. I am myself a great believer in the efficacy of such catalogues, and particularly when they are worked out with the appreciative care of Mr. Atkinson.

All descriptive papers—so naturally condemned by purely theoretical entomologists, and certainly the dry-as-dust appearance of such papers is sufficient to disgust the uninitiated—are, or should be, capable of not only increasing our knowledge of the multiplicity and diversity of genera and species, but should also contain the material which assists the study of geographical distribution. It may therefore be permissible to analyse the contents of this paper.

The *Plataspinæ* are an obscure and still imperfectly worked-out group. One species of *Coptosoma* is here described from Sikkim, and Mr. Atkinson has submitted to me another new species which he has either lately or will almost immediately describe himself. This genus is not only a somewhat difficult one to study, but the

smallness and obscurity of its species have not promoted its favour with Hemipterists; consequently we may safely affirm that our knowledge of the Oriental *Coptosomæ* is extremely limited. In the *Asopinæ* Sikkim has also given us a new genus allied to *Cazira*. In the *Pentatominæ* there are several interesting points. *Dolycoris verbasci* is a well-known and not uncommon Palearctic Pentatomid. Stål separated an allied Indian species under the name of *D. indicus*, whilst in this paper Formosa is shown to have another allied but distinct specific form. In *Scylax* we have a new genus, which, though strictly belonging to the *Pentatominæ*, has all the superficial characteristics of *Phyllocephalinæ*. Two species of *Carbula* are added to the Indian fauna, but we may safely affirm that our enumeration of this genus is still imperfect. The genus *Agæus* was hitherto only represented by two species,—one from Burma, the other found in Western Tropical Africa; a third from Assam is now added. The genus *Eurydema* usually produces novelties in most Old World collections, though I was not prepared for another new species in the Indian fauna. *Compastes* possessed only one known Indian species; Sikkim has now contributed two more to the list. The only other remark necessary is as regards *Basicryptus*, a genus of *Phyllocephalinæ*. This genus has its head-quarters in Tropical and Southern Africa; one species has been described from Australia, another from Manilla, and I have here been enabled to make known a species found in Northern India.

I have unfortunately been compelled to use—in more than one instance—such misleading habitats as "North India," and such inexact ones as "N. E. India." In these cases the fault is not to be visited on the writer, who possessed no other information. I hope the Society, on a future occasion, will allow me to proceed with some further descriptions of nondescripts in other families of the Oriental Heteroptera.

PLATASPINÆ.

Coptosoma fimbriatum, n. s.

Body above shining black; margin of head (broadly), eyes, ocelli, antennæ, lateral margins of pronotum, abdominal margin as seen at base of scutellum, head beneath, rostrum, legs, margins

of sternum and abdomen, and anal segment, reddish ochraceous; abdomen beneath shining black, sternum dull opaque black. Long. 5 mm.; max. lat. 5 mm.

Hab. Sikkim (Calc. Mus. and coll. *Dist.*).

The head is prominent, rounded in front, and not perceptibly sinuated in front of eyes; the ocelli are situate wide apart, rather nearer to the eyes than to each other, and the tibiæ are sulcated above.

ASOPINÆ.

SESHA, n. g.

Head somewhat long and prominent, concavely sinuate at lateral margins, lobes about equal in length, lateral lobes with their edges distinctly raised and carinate; ocelli wide apart, nearer to eyes than to each other. Pronotum with the disk gibbous, the margins carinate, the anterior angles obtusely spinous, the lateral angles produced into long slender spines, the anterior margin concave, the lateral margins between the anterior and lateral angles broadly sinuate, between the lateral angles and base also deeply sinuate, the base nearly straight. Scutellum short and broad, reaching a little beyond the base of membrane, the lateral angles somewhat acutely sinuate at middle, the apex broadly rounded. Corium slightly ampliated towards the middle of lateral margin. Membrane extending considerably beyond apex of abdomen. Rostrum reaching the intermediate coxæ. A raised and somewhat triangular plate between the posterior coxæ. Anterior femora with a strong spine beneath near apex; anterior tibiæ laminately ampliated on each side along apical half, much more strongly so outwardly.

This genus is allied to *Cazira*.

Sesha manifesta, n. s. (Pl. XII., fig. 2).

Body above pale stramineous, with the following dark blue shining spots: two at base of head attached to eyes; five on pronotum, two transverse near anterior margin, and three more oblong across disk; four on scutellum, two basal and two subapical, the basal much the largest; and two on corium, one at about centre of lateral margin, and one at apex, which is smallest. Membrane pale fuscous-hyaline, with some dark bluish spots near base, and the apex fuscous. Body beneath dark bluish; antennæ, rostrum, legs, prosternum, lateral margin of abdomen (narrowly), and some irregular lateral spots, a central longitudinal macular

abdominal fascia, and terminal segment stramineous. Long. 11 mm.; exp. pronot. angl. 8 mm.

Hab. Sikkim (Calc. Mus. and coll. *Dist.*).

Antennæ with the second joint a little shorter than the third, fourth and fifth joints longest and subequal, or fifth a little longer than the fourth. Pronotum and scutellum coarsely punctate; corium somewhat finely punctate.

PENTATOMINÆ.

Halyomorpha murrea, n. s. (Pl. XII., fig. 5).

Body above very pale greenish ochraceous, the corium (excluding outer marginal area), and basal area of pronotum with a slight purplish tinge. Head with the lateral margins, margins of central lobe, a small linear spot at base, and a similar spot on each side before the eyes, black. Eyes somewhat purplish; ocelli pale castaneous; antennæ with the basal joint pale greenish ochraceous minutely speckled with black, second and third joints purplish, apical half of third joint black (remaining joints mutilated). Pronotum with the lateral margins and a double series of spots on anterior half ochraceous; between and around these ochraceous spots are a number of small and somewhat tessellate black spots; basal half minutely and sparingly darkly punctate. Scutellum with four black spots at base, two central and one near each basal angle; four more obscure and broken black spots across disk, followed by two similar spots on basal half, some tessellate and minute black spots at apex, and a series of minute dark punctures on each lateral margin, from basal third to apex. Corium minutely and sparingly darkly punctate, costal area greenish, thickly and irregularly spotted with black, lateral margins near base ochraceous. Connexivum ochraceous, with a black linear spot at base and apex of each marginal segment. Membrane pale obscure creamy, minutely and sparingly speckled with black, basal two-thirds pale purplish from reflection of abdomen beneath. Body beneath and legs pale greenish, a linear spot in front and behind eyes, a spot near anterior and intermediate coxæ, a spot towards lateral margins of meso- and metasternum, a spot at base of anterior tibiæ, a spot near apex of intermediate and posterior femora, a marginal spot at base and apex of apical segments, and the apex of the rostrum, black. Long. 15 mm.;* exp. pronot. angl. 8 mm.

Hab. Sikkim (Calc. Mus.).

* This measurement extends to apex of projecting membrane.

The second joint of the antennæ is a little shorter than the third (remainder mutilated); the rostrum just passes the posterior coxæ, and the membrane extends considerably beyond the apex of the abdomen.

I have only seen one specimen of this distinct and beautifully-marked species.

Dolycoris formosana, n. s.

Allied to *D. indicus*, Stal, from which it differs by its larger size; the connexivum unicolorous, not spotted with black; the corium purplish brown; apices of the femora spotted with black, and apices of the posterior tibiæ of the same colour; the punctation is also somewhat coarser and deeper. Long. 13 mm.

Hab. Formosa (coll. *Dist.*).

Scylax, n. g.

Head very large, flat, and long, the lateral lobes very much longer than the central, slightly concave, obtusely pointed at apex, and cleft at apex in female, but apparently coalesced in male. Pronotum with the lateral angles very strongly produced forwardly into robust obtuse spines (in the typical species these spines have their apices parallel to the eyes); anterior margin concave for the reception of the head, the anterior angles minute and truncate; posterior margin straight, oblique from basal angles of scutellum to lateral angles. Scutellum short and broad, not extending much beyond base of membrane; the lateral margins obliquely directed inwardly to about middle, and then straight to near apex, which is broadly rounded. Corium short, not reaching apex of scutellum. Membrane with prominent reticulated veins. Rostrum long, about reaching the posterior coxæ. Antennæ inserted beneath the head in front of eyes, second joint barely reaching apex of head.

I place this genus near *Dichelocephala*, to which it has affinities though not resemblance. It has somewhat the facies of *Macrina*, in so far as the pronotal angles are examined, but that it does not belong to the subfam. *Phyllocephalinæ* is proved by the length of the rostrum.

Scylax porrectus, n. s. (Pl. XII., fig. 7).

Body above ochraceous. Head, pronotum, and scutellum somewhat thickly punctate; pronotum with two short transverse and one central short longitudinal levigate linear spots; scutellum with

a central longitudinal levigate fascia, which possesses a central row of minute punctures, and a few scattered punctures on each side. Corium with the costal area very sparingly and finely punctate, the inner area coarsely and somewhat thickly punctate. Membrane pale brownish ochraceous. Body beneath and legs ochraceous; the body somewhat finely and darkly punctate, and with a central and two sublateral fasciæ formed of blackish punctures; legs speckled with brownish. Long. 15 mm.

Hab. India (*sic*) (coll. *Dist.*).

The lateral lobes of the head are divided to near the apex of the central lobe, and the membrane extends to about half of the anal appendage. Antennæ with the second joint much shorter than the third, remainder mutilated. Rostrum reaching the posterior coxæ, its apex pitchy.

I have long possessed this specimen with only the above imperfect and misleading locality attached, and therefore hesitated to describe it; the following species, however, now received from Sikkim, prove its general habitat, and it was probably derived from some district of North-Eastern India.

Scylax macrinus, n. s. (Pl. XII., fig. 9).

Closely allied to *S. porrectus*, but differing by the somewhat smaller size, the lateral lobes of the head only cleft for a short distance before the head (coalesced in male), and the membrane not reaching the apex of the last abdominal segment. Long. 14 to 15 mm.

Hab. Sikkim (Calc. Mus. and coll. *Dist.*).

Carbula fusca, n. s.

Above shining fuscous-brown. Head somewhat thickly covered with bronzy-green punctures; eyes luteous; antennæ brown, the last joint with the apical two-thirds blackish. Pronotum with the anterior area and lateral margins punctured with bronzy-green, remaining area coarsely punctate, lateral angles prominently and obtusely produced, their apices reddish brown. Scutellum coarsely punctate, sometimes slightly shaded with bronzy-green. Corium coarsely punctate. Membrane pale hyaline. Body beneath, rostrum, and legs brown, the abdomen paler, with a broad central blackish fascia, on each side of which is a narrower and more irregular fascia of the same colour, and between these fasciæ are scattered dark punctures. Femora punctured or speckled with

blackish; head beneath and sternum coarsely and darkly punctate; mesosternum with a large irregular luteous spot on each side. Long. 7 to 8 mm.; exp. pronot. angl. 5 to 6 mm.

Hab. Darjiling, Sikkim, Nepal (coll. *Dist.* and Calc. Mus.).

This species is easily recognised by its prominent and obtusely rounded pronotal angles. The rostrum reaches the third abdominal segment. Antennæ with the second and third joints subequal in length, and much shorter than the fourth; fourth and fifth subequal in length; fifth moderately thickened.

Carbula scutellata, n. s.

Head luteous, covered with coarse black punctures, eyes fuscous, the ocelli red. Antennæ luteous, somewhat infuscated at apex. Pronotum luteous, coarsely and darkly punctate, the lateral margins levigate, the lateral angles produced into long acute black spines. Scutellum luteous, sparingly and coarsely darkly punctate, a large levigate spot at each basal angle, the apex also broadly impunctate; the punctures are usually thickest at lateral margins, and sometimes at base. Corium luteous with a purplish tinge, thickly and darkly punctate. Membrane pale hyaline. Connexivum luteous, with black segmental marginal spots. Body beneath and legs luteous, with a few scattered black punctures on disk and on femora, and the margins and apices of the pronotal angles black. Long. 8 mm.; exp. pronot. angl. 5½ mm.

Hab. Bombay (*Leith*); N. Khasia (*Chennell*); —— (coll. *Dist.*).

The fourth and fifth joints of the antennæ are subequal in length, and the rostrum just passes the posterior coxæ.

Agœus mimus, n. s. (Pl. XII., fig. 1).

Head fuscous, the central lobe, excluding apex and lateral margins, ochraceous; eyes greyish; antennæ black, apices of the joints minutely greyish. Pronotum reddish ochraceous, with thirteen fuscous spots arranged six at base, of which two almost occupy the lateral angles and the intervening four are more or less triangular; five discal, of which the central one is longest and intervenes between the two central basal spots, and also between two large spots placed near anterior margin. Scutellum fuscous, with a central longitudinal ochraceous line, and a similar line extending from each basal angle and meeting central line on disk. Corium reddish ochraceous, with fuscous punctures and some

irregularly-shaped spots of the same colour, of which the most prominent are a claval streak, three discal (the lowermost largest), one large and long costal spot at about centre, and three subapical spots (the central largest). Membrane bronzy-brown. Abdomen above reddish. Head beneath ochraceous, margins of rostral canal, margins of antennal bases, and a fascia from the same to base of head, fuscous. Prosternum fuscous, anterior and posterior margins and a transverse discal line ochraceous; lateral margins and a spot near coxæ reddish. Meso- and metasternums fuscous, their margins and the odoriferous apertures ochraceous, and with reddish spots near bases of coxæ. Abdomen beneath reddish ochraceous, ornamented with a number of large dark fuscous spots. Legs fuscous, the femora streaked with ochraceous. Rostrum black. Long. 23 mm.; exp. pronot. angl. 10 mm.

Hab. Assam (Calc. Mus.).

The second joint of the antennæ is shorter than the third, the third and fourth subequal in length (fifth joint mutilated). The head is rather thickly and finely punctate, excepting the lateral margins, which are levigate. Pronotum more coarsely and sparingly punctate, the lateral margins levigate and finely crenulate anteriorly, the lateral angles obtusely pointed and slightly produced. Scutellum coarsely and rather closely punctate. Corium finely and sparingly punctate. Rostrum dislocated in specimen described, but apparently reaching the third abdominal segment. Abdomen with a central longitudinal sulcation.

This species is allied to *A. tessellatus*, Dall., and now makes a second described Indian species. It can be at once separated from Dallas's species by the different markings, different colour of the legs, rostrum, &c.

Eurydema multipunctata, n. s. (Pl. XII., fig. 6).

Body above pale ochraceous, sometimes suffused with purplish above. Head with the margins of the central lobe (angulated externally about centre) and the base black. Antennæ ochraceous, the apex of the third, and the fourth and fifth joints palely infuscated. Pronotum with twelve black spots, arranged four on the anterior margin, remainder on disk, three in each angular area, and two at centre. Scutellum with ten black spots, situate four at base, four near centre, and two before apex. Corium with three black spots arranged somewhat longitudinally. Membrane blackish, pale hyaline at apex and margins. Body beneath pale ochraceous; head with two black spots at base, sternum with a

double submarginal series of black spots, a transverse black spot on each side of metasternum, and a double series of black marginal spots to abdomen. Rostrum ochraceous, with the apex pitchy. Long. 8 to 9 mm.

Hab. ——? (Calc. Mus. and coll. *Dist.*).

The fourth joint of the antennæ is longest, and the rostrum reaches the posterior coxæ.

The variation in colour and size of this species is very marked. Some specimens are almost purplish above, and others nearly pale uniform stramineous. The numerous black spots, however, appear to be quite constant both in position and number. Unfortunately no exact locality is affixed to the specimens.

Alcimus flavicornis, n. s.

Head black, with the following yellow markings: three central lines on anterior half, a linear spot near base, and a similar spot in front of each eye. Antennæ fuscous-brown. Pronotum very dark obscure ochraceous, thickly covered with coarse dark punctures; anterior fourth black with five yellow spots, situate one on each lateral margin, and three central angulated spots, two near anterior margin and one between and behind them, apical angles widely produced laterally and upwardly, their apical thirds yellow, extreme apices black. Scutellum and corium dark obscure ochraceous, darkly and coarsely punctate, irrorated with levigate yellow markings, and the scutellum with two large yellow levigate spots near basal angles. Membrane fuscous, its apex paler. Head and prosternum beneath as above, with two fused yellow spots on each side of eyes, the apices of the pronotal angles yellow as above. Meso- and metasternums and abdomen beneath ochraceous; the sutures, a series of sublateral streaks, and a central longitudinal fascia to abdomen, blackish. Rostrum and legs dark castaneous, femora more or less streaked with yellowish. Long. 8 to 9 mm.; exp. pronot. angl. 10 to 12 mm.

Hab. Sikkim (Calc. Mus. and coll. *Dist.*).

Antennæ with the second and third joints longest and subequal in length, fourth shorter than third and longer than fifth. Rostrum just passing the posterior coxæ.

Hoplistodera incisa, n. s. (Pl. XII., fig. 3).

Ochraceous with brownish tints. Head finely and sparingly punctate. Antennæ ochraceous, becoming darker towards apex. Pronotum sparingly but coarsely punctate, the lateral angles

produced into robust subacute spines, the apices very slightly reflexed backwardly, and with a notched tubercle beneath at about half their length. Scutellum with the basal half very sparingly but coarsely punctate, the apical half thickly punctate. Corium coarsely and irregularly punctate. Membrane pale hyaline. Body beneath ochraceous, with a sublateral series of castaneous spots on each side; legs pale luteous, the femora annulated with brown near apex. Rostrum ochraceous, the apex pitchy and extending a little beyond posterior coxæ. Antennæ with the second and third joints subequal in length, apical joint longest. Long. 8 mm.; exp. pronot. angl. 9 mm.

Hab. Mungphu, Sikkim, Assam (Calc. Mus. and coll. *Dist.*).

This species is allied to the Javan *H. testacea*, Hope.

Antestia modificata, n. s. (Pl. XII., fig. 4).

Ochraceous, spotted with bluish black. Head luteous, the margins of the central lobe, margins of the lateral lobes in front of eyes, and two spots at base, bluish black. Eyes brownish. Antennæ bluish black. Pronotum with eight bluish black spots, six largest arranged in double series on disk, and a small rounded spot in each lateral angle. Scutellum with six bluish black spots, four largest arranged in double series on disk, and a smaller elongate spot in each basal angle. Corium with four bluish black spots, situate one at base, one at apex, and two central. Membrane pale hyaline, with a large bluish black subquadrate spot at base. Body beneath pale luteous, sternum spotted with bluish black, and abdomen with sutural fasciæ and lateral spots of the same colour. Legs luteous, femora with a blackish spot near their apices. Long. 7 mm.

Hab. Sikkim (Calc. Mus. and coll. *Dist.*).

Antennæ with the second joint shorter than the third, fourth and fifth joints longest. The body above is very sparingly punctate.

Aboena? serrata, n. s.

Above ochraceous, thickly, darkly, and coarsely punctate; connexivum reddish ochraceous, with black linear spots near bases and apices of segmental sutures. Antennæ four-jointed, first and second joints dark ochraceous; third and fourth joints luteous, with their apical halves blackish; second joint very long, as long as third and fourth put together, third and fourth subequal in length. Head with the lateral lobes much longer than central

lobe, but notched in front. Pronotum with the lateral margins serrated, the lateral angles moderately and broadly produced and obtusely bispined. Scutellum with a small blackish fovcate spot in each basal angle. Membrane brownish ochraceous. Body beneath with the head, legs, rostrum, and sternum ochraceous, the abdomen brownish ochraceous. Head with a black linear spot on each side of base of antennæ. Prosternum with some scattered black punctures. The rostrum just passes the intermediate coxæ, and the tibiæ are sulcated above. The abdomen is obtusely sulcated to about the fourth abdominal segment. Long. 14 mm.; exp. pronot. angl. 9 mm.

Hab. Bombay (coll. *Dist.*).

I have placed this species in the genus *Abcona*, with whose structural characters it seems to agree. In the typical species Stal describes "antennæ maxima parte et rostrum mutila," so that, if I am right, the other distinguishing characters of *Abcona* are four-jointed antennæ and rostrum reaching the intermediate coxæ.

Compastes truncatus, n. s. (Pl. XII., fig. 10).

Brownish ochraceous, covered with coarse and darker punctures; connexivum luteous, with blackish spots at bases and apices of sutures. Membrane brownish, the venation darker. Antennæ with the first, second, and third joints brownish, minutely darker at apices (remainder mutilated); second joint longer than third. Pronotum with the lateral margins obtusely crenulate, the lateral angles produced into broad and apically truncated spines. Body beneath and legs ochraceous, punctured with brownish. Rostrum ochraceous, its apex pitchy and reaching the second abdominal segment. Ventral spine reaching the intermediate coxæ. Long. 16 mm.; exp. pronot. angl. 10 mm.

Hab. Sikkim (Calc. Mus. and coll. *Dist.*).

The truncated apices of the pronotal angles will alone render this species easily distinguishable.

Compastes spinosus, n. s. (Pl. XII., fig. 11).

Above brownish, coarsely and darkly punctate. Pronotum rugulose, with a central longitudinal luteous line, the lateral margins with three prominent spines, the lateral angles broadly produced and somewhat obtusely spined posteriorly. Membrane pale fuscous. Body beneath brownish and darkly punctate; legs

ochraceous, mottled and spotted with brownish; sublateral margins of the sternum bronzy. Rostrum ochraceous, with its apex pitchy and passing the posterior coxæ. Antennæ mutilated. Long. 17 mm.; exp. pronot. angl. 8 mm.

Hab. Sikkim (coll. *Dist.*).

Placosternum cervus, n. s.

Allied to *P. taurus* by the lateral angles of the pronotum being profoundly bisinuated at their apices, but smaller than that species, and having the lateral angles very much more developed, they being broadly and strongly produced upwardly and forwardly, and deeply notched at each edge of the apex. The lateral angles of the pronotum are not simply crenulate, but shortly spinous. Long. 19 mm.; exp. pronot. angl. 17 mm.

Hab. Assam; Sadia, 350 ft. (*Chennell*)—coll. *Dist.*

ACANTHOSOMINÆ.

Sastragala rufispina, n. s.

Body above dark ochraceous, pronotal angles purplish red. Head finely and transversely wrinkled, apical portion of the central lobe excavated and foveate (antennæ mutilated). Pronotum, scutellum, and corium somewhat sparingly and coarsely punctate. Pronotum with the lateral angles produced into obtusely pointed spines. Membrane pale hyaline, blackish at base. Body beneath very pale ochraceous, legs a little darker in hue; rostrum with the apex pitchy and reaching the second abdominal segment, last abdominal segment with two small black spots at apex. Pronotal spines red beneath as above. Long. 17 mm.; exp. pronot. angl. 11 mm.

Hab. North India (*sic*). Col. Buckley (coll. *Dist.*).

Sastragala mustelina, n. s.

Body above ochraceous, membrane pale brownish, connexivum with the segmental spines black. Antennæ ochraceous, apical half of the third joint infuscated; third joint much longer than second (remainder mutilated); head somewhat obscurely transversely wrinkled, eyes pitchy. Pronotum, scutellum, and corium coarsely punctate. Pronotum with the lateral angles produced into long, straight, somewhat conical, and subacutely pointed spines. Body beneath, rostrum, and legs coloured as above. Rostrum with the extreme apex pitchy. Long. 13 mm.; exp. pronot. angl. 11 mm.

Hab. Naga Hills (*Capt. Butler*)—coll. *Dist.*

Sastragala binotata, n. s. (Pl. XII., fig. 12).

Apex above brownish ochraceous, corium with the lateral margins—widened into a spot at centre—dull ochraceous, inwardly shaded with blackish. Membrane bronzy. Head transversely wrinkled; antennæ ochraceous, third joint much longer than the second (remainder mutilated). Pronotum and scutellum sparingly and coarsely punctate, the corium more thickly punctate. Pronotum with the lateral angles produced into long, somewhat conical spines, their apices subacute and very slightly reflexed backwardly. Body beneath and legs ochraceous, rostrum with the apex pitchy. Long. 13 mm.; exp. pronot. angl. 10 mm.

Hab. Sikkim (coll. *Dist.*).

Sastragala parmata, n. s.

Body above brownish ochraceous; pronotal spines reddish brown; scutellum with a large cordate ochraceous spot surrounded with blackish. Antennæ ochraceous, third and fourth joints somewhat darker, second and third joints subequal in length, a little shorter than fourth (remainder mutilated); eyes purplish brown. Pronotum sparingly and coarsely punctate, the lateral angles produced into long thick rounded spines, very slightly reflexed at apices. Scutellum with the central spot levigate, remainder coarsely punctate, the apex ochraceous. Corium coarsely punctate, with the lateral margin luteous and levigate. Body beneath and legs ochraceous; rostrum with the apex pitchy. Long. 12 mm.; exp. pronot. angl. 9 mm.

Hab. North India (*sic*), (coll. *Dist.*).

Sastragala javanensis, n. s.

Body above pale brownish; head, lateral and anterior margins and a transverse fascia across anterior disk of pronotum, and the lateral margins of the corium, luteous; eyes and pronotal spines black; scutellum black, with a large rounded discal ochraceous spot. Antennæ ochraceous, second joint shortest, third and fourth joints longest and subequal in length. Pronotum with the posterior disk coarsely punctate, the anterior portion impunctate, excepting a row of punctures on anterior margin, the lateral angles produced into long acutely pointed spines, very slightly reflexed at apices. Scutellum coarsely punctate, excepting the central luteous spot, which is levigate. Corium thickly and coarsely punctate, excluding lateral margins, which are levigate. Membrane pale ochraceous

and subhyaline; abdominal appendages black. Body beneath and legs luteous, abdominal spines luteous beneath, apical angles of last abdominal segment black. Long. 12 mm.; exp. pronot. angl. 10 mm.

Hab. Java; Kederi (*Baron von Hucgel*)—coll. *Dist.*

Anaxandra fulvicornis, n. s.

Body ochraceous, with an olivaceous tinge; anterior lateral margins of head, a central narrow longitudinal fascia commencing before apex of head and terminating on disk of pronotum, and the lateral margins of the scutellum—joined together before apex—black. Antennæ with the basal joint ochraceous (remainder mutilated). Pronotum with the posterior disk coarsely punctate, the lateral angles produced into long, slightly ascending, and forwardly directed dull luteous spines, their apices very slightly reflexed and subacute. Scutellum with the basal two-thirds luteous, posteriorly rounded and margined with black. Corium coarsely punctate and rugulose. Membrane bronzy. Body beneath and legs ochraceous; mesonotum with an oblique black line on each side. Long. 15 mm.; exp. pronot. angl. 14 mm.

Hab. Sikkim (coll. *Dist.*).

This species by its colour markings is very closely allied to *A. nigro-lineata*, Stål, but differs by the much less expanse of the pronotal angles, which in Stål's species are described as measuring $18\frac{1}{2}$ mm.

Anaxandra tauriformis, n. s.

Body above bright castaneous; lateral margins of the head, anterior and lateral margins and posterior disk of the pronotum, lateral margins of the scutellum, lateral margins of the corium, and the membrane, ochraceous. Antennæ with the first and second joints ochraceous (remainder mutilated). The head is transversely wrinkled and possesses a few dark punctures; the eyes are greyish brown, inwardly margined with ochraceous. The pronotum is sparingly and coarsely punctate on disk, and thickly punctate on anterior margin. The pronotal angles are produced into long upwardly and forwardly directed spines, the apices of which are distinctly truncately reflexed backwardly; these spines are sparingly punctate for about half their length. Scutellum sparingly and coarsely punctate. Corium thickly punctate. Abdominal spines castaneous. Body beneath and legs ochraceous; abdominal

spines castaneous as above, but inwardly margined with blackish. Long. 15 mm.; exp. pronot. angl. 14½ mm.

Hab. Khasia Hills (coll. *Dist.*).

Anaxandra compacta, n. s.

Body above ochraceous, with an olivaceous tinge; head with the basal margin, a spot behind each eye, and the margins of the central lobe—not reaching apex,—two circular enclosing lines near anterior margin of pronotum, and a large central rounded spot near base of scutellum, black; pronotal angles castaneous. The pronotum and scutellum are very obsoletely and obscurely punctate, the corium finely but distinctly punctate. The pronotal angles are produced into short but robust spines, their apices rounded above and subtruncate. Body beneath ochraceous, much tessellated with black, pronotal spines castaneous as above. Long. 10 mm.; exp. pronot. angl. 10 mm.

Hab. Assam; Sadia, 350 ft. (*Chennell*)—coll. *Dist.*

Clinocoris scutellata, n. s.

Body above ochraceous, thickly and coarsely punctate; pronotal spines rosy red; scutellum with a blackish central longitudinal fascia extending from about base to centre. Antennæ ochraceous. Pronotum with the lateral angles straightly produced into subacute spines, the apices of which are slightly reflexed backwardly, and the posterior margins somewhat sinuated. Membrane pale hyaline, with reflections of the red upper surface of the abdomen. Body beneath and legs ochraceous; sternum coarsely punctate. Long. 8 mm.; exp. pronot. angl. 6 mm.

Hab. Assam; Naga Hills, 2000 to 6000 ft. (*Chennell*)—coll. *Dist.*

Clinocoris maculata, n. s.

Body above dark ochraceous; pronotum and scutellum coarsely but sparingly punctate, corium thickly punctate, pronotal spines black, corium with a levigate ochraceous spot on disk of apical area. The punctures are all dark brownish, and the corium is thus much darker than the pronotum or scutellum. The pronotal lateral angles are produced into stout spines, the apices of which are subacute and prominently reflexed, and their posterior margins sinuated. Membrane very pale ochraceous, pitchy towards apex. Body beneath apparently ochraceous, but imperfectly seen owing to specimen being *carded*. Long. 8 mm.; exp. pronot. angl. 6 mm.

Hab. North-east India (coll. *Dist.*).

UROLABIDINÆ.

Urochela pulchra, n. s. (Pl. XII., fig. 8).

Body above ochraceous, shaded and punctured with brownish. Head and pronotum brownish, margins of pronotum olivaceous; antennæ brownish, second joint longer than the first (remainder mutilated); scutellum olivaceous, with scattered coarse brown punctures, with some mottled markings and a spot in each basal angle of the same colour. Corium olivaceous, with large irregular coarse brown punctures on inner area, the clavus brownish. Membrane brownish, the apex paler. Body beneath brownish, laterally spotted with ochraceous; connexivum ochraceous spotted with black; legs ochraceous, femora speckled with brownish; rostrum with the apex pitchy. Long. 15 mm.

Hab. Sikkim (coll. *Dist.*).

Urochela ferruginea, n. s.

Body above brownish ochraceous, very thickly and darkly punctate. Head with the eyes fuscous, and two central lines of the same colour; antennæ fuscous, first and second joints subequal in length, third very short (remainder mutilated). Pronotum with a central longitudinal line and the margins narrowly luteous. Scutellum with a central longitudinal line, a linear spot at basal angles, the apex, and the margins narrowly luteous. Corium with the margins narrowly, and some longitudinal discal lines luteous. Membrane fuscous. Connexivum fuscous, with lineate ochraceous spots. Body beneath brownish ochraceous, tinged with fuscous, and with fuscous lateral spots, connexivum as above; legs brownish ochraceous, apices of the tibiæ and tarsi fuscous. Long. 12 mm.

Hab. Assam (coll. *Dist.*).

Urolabida Chennelli, n. s.

Body above reddish ochraceous, marked with black and luteous. Head with the central and anterior portions luteous, the eyes fuscous; antennæ with the first joint reddish ochraceous (remainder mutilated). Pronotum with a blackish discal semicircular line, between which and base the colour is paler and thickly punctured with fuscous; on the anterior disk are two levigate luteous spots. Scutellum luteous with three black basal spots, one central and one at each angle, a large rounded reddish ochraceous spot divided by a central longitudinal luteous line, and the apical area thickly

punctured with fuscous. Corium with the inner claval and the apical margins black, these black lines outwardly and broadly margined with luteous, the costal margin of the same colour. Membrane pale hyaline. Body beneath and legs luteous, apices of the femora beneath, and apices of the tarsi and rostrum, blackish. Long. 15 mm.

Hab. Assam; Naga Hills, 2000 to 6000 ft. (*Chennell*) —coll. *Dist.*

Urolabida khasiana, n. s.

Above luteous with reddish ochraceous markings, a small black spot at each lateral pronotal angle, and two black spots on apical margin of corium. Head with some reddish ochraceous markings behind the eyes, which are blackish; antennæ with the first and second joints ochraceous (remainder mutilated). Pronotum with the anterior and lateral margins and two transverse fasciæ on disk reddish ochraceous. Scutellum with the lateral margins reddish ochraceous. Corium reddish ochraceous, the lateral, claval, and apical margins luteous, the last with two prominent black spots. Membrane pale hyaline. Body beneath and legs luteous; apex of rostrum, a spot on apices of femora beneath, and the apices of the tarsi black. Long. 14 mm.

Hab. Assam; North Khasia, 1500 to 3000 ft. (*Chennell*)—coll. *Dist.*

TESSARATOMINÆ.

Eusthenes antennatus, n. s.

Head, pronotum, and corium purplish brown; legs ochraceous; scutellum very dark olivaceous, with the apex castaneous; membrane shining brassy brown. Antennæ with the basal and apical joints ochraceous, the last with the apex blackish, second and third joints blackish, the base of the second joint very narrowly ochraceous. Body beneath brownish ochraceous, or in some specimens castaneous; legs castaneous, the tarsi very slightly paler. Antennæ with the apical joint somewhat longest, the second joint very slightly longer than the third; the pronotum is finely transversely striate, the scutellum more coarsely so, the corium thickly and finely punctate; posterior femora armed with a long spine, and with a double row of short spines on apical half of under surface, of which the two last are the longest. Long. 35 to 36 mm.; exp. pronot. angl. 12 mm.

Hab. Khasia Hills, Nepal, Assam (coll. *Dist.*).

The elongate form of the body and colour of the

antennæ are sufficient to readily distinguish this from the other species of the genus. It is of a variable nature, as the connexivum is generally purplish brown, with an ochraceous spot at base of segments, but these spots are sometimes scarcely visible. In one specimen now before me the right-hand third joint of the antennæ is normal, whilst the left-hand corresponding joint has the apex broadly ochraceous.

Eusthenes eurytus, n. s.

Allied to *E. hercules*, Stal, but smaller, the pronotum much less rounded at anterior-lateral margins, and the lateral angles even less produced than in that species. Antennæ wholly black, the apical joint very narrowly ochraceous at its apex. Tarsi bright ochraceous. Long. 36 mm.; exp. pronot. angl. 16 mm.

Hab. India (*sic*).

I have no better locality for this species than the vague one of "India." It has been in my collection for some years, and, not having received another, I take this opportunity of describing it.

PHYLLOCEPHALINÆ.

Basicryptus illuminatus, n. s.

Body above dull dark reddish; pronotum with a broad discal transverse luteous fascia margined with black, attenuated at each each end, and slightly notched beneath at centre. Head with the eyes dull ochraceous; antennæ with the first, second, and third joints reddish (remainder mutilated). Pronotum with the lateral margins somewhat finely crenulated, the lateral angles broadly and subacutely produced. Scutellum with a small luteous spot in each basal angle, and a few very small luteous spots at apex, and with some central and lateral black punctures. Corium with the base of lateral margin narrowly luteous, and with some very small and irregular scattered black spots. Membrane pale hyaline, somewhat thickly ornamented with small fuscous spots. Body beneath and legs dull reddish, with blackish punctures; disk of sternum and some sublateral streaks to abdomen obscure luteous; tarsi somewhat ochraceous beneath. Long. 14 mm.; exp. pronot. angl. 10 mm.

Hab. North India (*sic*), (coll. *Dist.*).

Gonopsis rubescens, n. s.

Body above sanguineous. Head somewhat obscurely punctate, antennæ reddish, third joint shorter than second or fourth, fifth joint longest and pilose. Pronotum with the lateral margins finely crenulated, the lateral angles produced into short subacute spines; between these spines is a transverse ridge, before which the surface is obliquely deflected towards the head; the pronotum is also transversely rugulose, excepting two levigate spots on anterior area. Scutellum longitudinally rugose, with a row of black punctures on basal half of lateral margins. Corium obscurely punctate and finely rugulose, with a few black punctures near inner apical angle. Membrane pale hyaline. Body beneath and legs pale reddish; the body is very finely and darkly punctate, and the tibiæ have a fuscous spot on under side of apices. Long. 14 mm.; exp. pronot. angl. 7 mm.

Hab. Sikkim (coll. *Dist.*).

Explanation of Plate XII.

Fig. 1. *Agæus mimus.*
2. *Sesha manifesta.*
3. *Hoplistodera incisa.*
4. *Antestia modificata.*
5. *Halyomorpha murrea.*
6. *Eurydema multipunctata.*
7. *Scylax porrectus.*
8. *Urochela pulchra.*
9. *Scylax macrinus.*
10. *Compastes truncatus.*
11. „ *spinosus.*
12. *Sastragala binotata.*

XVII. *Further additions to the* Rev. T. A. Marshall's *Catalogue of British* Ichneumonidæ. By John B. Bridgman, F.L.S.

[Read September 7th, 1887.]

The additions to the Rev. T. A. Marshall's list of British *Ichneumonidæ* appear interminable: new species and species new to Britain are constantly occurring. Since my last paper Mr. G. C. Champion very kindly sent me a box of well-set ichneumons, most of which came from Aviemore, and contained several species new to our list. Professor C. G. Thomson has kindly examined my species of *Exochus*, and the species of *Ichneumon luctatorius* group, among which were several of his new species. I am also indebted to many other entomologists for insects sent to me.

Ichneumon rufidorsatus, n. s.

Mesothorace supra, scutello, abdominis basi, pedibusque rufis, coxis nigris; annulo antennarum rufo.

Head rather remotely punctate; punctures not deeply impressed; antennæ rather stout, slightly thickened between the middle and the apex, the latter attenuate, scarcely more than half the length of the body; 1st joint of flagellum almost twice as long as wide, 4th quadrate; head behind the eyes not narrow. Thorax scarcely narrower than the head; mesonotum somewhat shining, punctate, punctures not very close; scutellum shining, with scattered punctures; metathorax subopaque, very finely rugose, with three superior areæ; supero-medial area quadrate; costæ fine; spiracles almost linear. Abdomen scarcely wider than the head and thorax, elongate-ovate; 2nd, 3rd, and 4th segments almost the same width, transverse; the 1st segment almost smooth and shining, obsoletely reticulate, with a few scattered punctures at the apex; remaining segments closely and finely punctate; the gastrocœli transverse, not deeply impressed, the space between them a little narrower than the middle area of the post-petiole; aculeus distinctly projecting beyond the 7th segment.

Areolet of wings open above, recurrent nervure received just beyond the middle; legs moderate.

Head black, mouth piceous, scape of antennæ black; 1st to 8th joints of flagellum fuscous; 9th to 11th reddish; the remainder black. Thorax black; collar above, mesonotum and scutellum red; tubercles and squamulæ reddish or piceous; 1st to 3rd segments of the abdomen red; 4th and 5th black; 6th and 7th reddish or fulvous. Legs red; coxæ black, front ones red beneath; trochanters black at the base; apical joint of tarsi fuscous. Stigma pale testaceous. Female. Length, 7 mm.

One female taken by Mr. G. C. Champion at Aviemore.

This appears to be undescribed; it comes very near to *I. picticollis*, Holm., but has differently-coloured legs.

Herpestomus distinctus, n. s.

Segmentis 2—3 pedibusque rufis, femoribus et tibiis posticis apice fuscis.

Head subopaque, not punctate, transverse, scarcely narrowed behind the eyes; clypeus distinctly separated from the face, apex widely rotundate; face transverse, rather prominent in the middle; antennæ scarcely half the length of the body, stout, somewhat clavate; 1st and 2nd joints of flagellum scarcely longer than wide, 3rd quadrate, remainder transverse. Mesonotum distinctly trilobed, with somewhat scattered punctures; scutellum flat, with scattered punctures; metathorax about as long as wide, obsoletely rugose; supero-medial area elongate, about one-third longer than wide, sides parallel, rounded in front, lateral areæ subdivided; postero-medial area very slightly depressed in the middle. Abdomen subopaque, obsoletely reticulate, covered with rather scattered short pubescence; aculeus just exserted; 1st segment somewhat irregularly and rather coarsely aciculate, apex shining; base of 2nd segment with a very shallow transverse impression, interrupted in the middle. Legs rather stout. Wings with the outer nervure of the areolet subobsolete; radial cell short, almost as broad as long.

Black, scape and two first joints of flagellum reddish; 8th and 9th joints show indications of pale marks; extreme apex of 1st and 4th segments of the abdomen reddish; 2nd and 3rd entirely red. Legs red; apical half of hind femora, apex and extreme base of hind tibiæ, and apical joint of hind tarsi, fuscous. Tegulæ piceous, stigma and nervures pale fuscous. Female. Length 5 mm.

One female was taken by Mr. G. C. Champion at Caterham.

This very distinct species is easily known from the two other species having the 1st segment aciculate; *flaviger* has the orbits, thorax, and scutellum yellow-marked; *striatus* has the antennæ longer, two-thirds the length of the body.

Phæogenes versutus, Wesm.

Wesm., Tent., 1844, 186, ♀.

Mr. G. C. Champion has taken a female *Phæogenes* at Mickleham, which I believe to be this species.

Hemiteles albomarginatus, n. s.

Niger; pedibus rufis basi nigris; segmentis 5—7 abdominis albomarginatis; aculeo dimidio abdominis longiore.

Shining; head wider than the thorax, transverse, very narrow behind the eyes towards the neck, almost free from punctures, slightly pubescent; antennæ about as long as the body, thin, almost filiform, rather thinner at the base than in the middle, apex slightly attenuated; 2nd and 3rd joints of the flagellum of equal length, nearly four times as long as wide. Thorax a little longer than high; mesonotum distinctly trilobed with somewhat scattered punctures, more sparingly punctured on the lateral lobes; scutellum gibbose, with scattered punctures; metathorax with five distinct areæ; costæ very prominent, rather coarsely rugose; supero-medial area about as long as wide, pentagonal. Abdomen elongate-ovate; apex of 2nd segment the widest (this is almost wider than the thorax); apex of 1st segment broad, about one-fourth longer than the width of the apex; spiracles not projecting, rugosely punctate, apex smooth; remaining segments transverse; 2nd and 3rd with a somewhat distinct transverse central depression, 2nd between the base and the depression rugosely punctate, 3rd shows indistinctly the same sculpture in the centre; aculeus about two-thirds the length of the abdomen. Wings with an imperfect pentagonal areolet, nervelet distinct, radial cell rather short; 3rd division of the costa one-third longer than the inner division of the radial nervure; transverse anal nervure slightly ante-furcal, divided one-third from bottom. Legs slender.

Black; incision of the 2nd segment of the abdomen faintly reddish; 5th to 7th with a distinct white apical margin. Legs red; coxæ, base of trochanters, and base of femora behind, more

or less black, hinder ones the most so; apical joints of the tarsi fuscous. Tegulæ and base of wings white; stigma fuscous, base pale; wings slightly fuscous. Female. Length nearly 5 mm.

One female taken by Mr. G. C. Champion at Box Hill.

Aptesis hemiptera, Gr., ♂.

Mr. J. J. Walker has fortunately bred both sexes of *A. hemiptera* from *Catoptria microgramma*, and I am indebted to Mr. G. C. Bignell for a pair of them. C. G. Thomson, in Opuscula Ent., 993, 70, described an insect as the male of *A. hemiptera*, but it is evidently not the true male. He says the stigma at the base is not broadly white; in Mr. Walker's male the base is white, as in the female, and legs are differently coloured. It is like no male that I have seen any description of.

Head and thorax smooth and shining, with a few punctures very minute, and almost obsolete; head transverse, sides behind the eyes slightly sloping; antennæ filiform, about three-fourths the length of the body. Thorax short, about as long as high, as wide as the head, distinctly trilobed in front; metathorax short; supero-medial area subquadrate, smooth and shining; lateral areæ divided (these and posterior face, which is rather concave and subdivided by two perpendicular lines, rather finely rugose); posterior transverse costa terminating laterally in a short spine. Abdomen subovate, almost as wide as the thorax, rather longer than the head and thorax, apex of 3rd and base of 4th segments the widest part; post-petiole quadrate, twice as wide and one-third shorter than the petiole; spiracles not prominent; 1st and 2nd segments distinctly aciculate, 3rd obsoletely so in the middle; abdomen covered with rather scattered pubescence; 2nd and remaining segments transverse. Legs rather slender; calcariæ of hind tibiæ almost half as long as 1st tarsal joint. Wings with an imperfect pentagonal areolet; radial cell short and wide; posterior inferior angle of discoidal cell acute; transverse discoidal nervure divided below the middle, transverse anal subopposite, divided below the middle.

Black; 2nd and greater part of 3rd segments castaneous; front and middle legs pale chestnut; coxæ, base of trochanters, tarsi, and extreme apex of middle tibiæ, black; hind legs black; apex of trochanters, base of femora, and middle of tibiæ, red. Tegulæ piceous; stigma black, base white; wings smoky, with a sub-obsolete white blotch against the stigma, as in the female, but less distinct. Length, 5 mm.

Pezomachus sylvicola, Fst.

Fst., Mon. Gatt. Pez., 102, 27, ♀.

Mr. G. C. Champion has taken a female *Pezomachus*, which I believe to be this species. It differs only in one respect from Förster's description: he says, "aculeus scarcely as long as the 1st segment." Mr. Champion's insect has the aculeus about one-third the length of the 1st segment. I believe the aculeus varies in length in some species; in *P. Neesii* it varies very much. This insect looks a great deal like a very smooth and shining specimen of *P. zonatus*.

A single female was taken at Caterham.

Pezomachus Neesii, Fst., ? var.

I have seen amongst Pezomachi collected by Mr. Billups and Mr. Champion what I considered a small variety of *P. Neesii*, Fst., but on closer examination I find the differences constant; the aculeus projects rather more than is usual in *Neesii*, the 1st segment only of the abdomen is red, the remainder purplish brown with the incisions faintly reddish, the base of the antennæ generally darker, and flagellum with eighteen joints; whilst the genuine *P. Neesii*, with the partially red 2nd segment of the abdomen, always, as far as my observation goes, has twenty joints in the flagellum. I am inclined to think it is a good species and not a variety.

Pezomachus Debeyii, Fst.

Fst., Mon. Gatt. Pez., 110, 37, ♀.

Mr. Champion has taken a *Pezomachus* at Sheppy, which agrees with this species, except that it has the spiracles on the 1st segment slightly projecting.

Pezomachus æmulus, Fst.

Fst., Mon. Gatt. Pez., 146, 86, ♀.

In Mr. Champion's collection are two specimens of a *Pezomachus* which I believe to be this species; it differs from Förster's description in having the aculeus longer, which he says is scarcely longer than half of the 1st segment; these two have it almost as long as the

segment. Förster knew but one specimen. The apex of the abdomen in one of the two is brownish.

Sagaritis fasciata, n. s.

Segmentis mediis rufo-fasciatis, segmento tertio transverso, aculeo segmento primo longiore.

♀. Sides of head behind the eyes very slightly oblique; antennæ of female not more than half the length of the body; supero-medial area of metathorax about as long as wide, closed behind; lateral areæ subdivided. Post-petiole rather wider than long, about twice the width of the petiole, sides scarcely swollen, 2nd segment rather longer than wide, 3rd transverse, aculeus almost as long as one-third of the abdomen. Areolet of wings petiolated; recurrent nervure received just before the middle; transverse anal nervure not divided.

Black; palpi and mandibles fulvous-yellow; 1st segment of abdomen with a very narrow red margin, 2nd and 3rd with a broad apical red band, 4th obscurely red at the sides of the apical margin. Legs red, coxæ black; middle and hind trochanters black-marked at the base, yellowish at the apex; extreme base of femora yellowish; hind tibiæ white, apex and before the base dark; middle tibiæ slightly fuscous at the apex; base of 1st joint of hind tarsi pale, remainder fuscous, articulations slightly paler; middle tarsi the same, but the brown much paler; stigma piceous-yellow, tegulæ yellow.

♂. Differs only from the female in having the antennæ longer, supero-medial area of metathorax a little narrower and imperfectly closed behind, the 2nd and 3rd segments of the abdomen longer, the latter rather longer than wide, and the transverse anal nervure of hind wings obsoletely divided below the middle; the abdomen is more highly coloured, the apex of the 3rd segment has a dark mark in the middle, and the sides of the remainder are broadly red; the black at the apex of the hind tibiæ is more inclined to red. Male and female. Length, 6·5—7 mm.

I took two females and one male together at Horning Ferry, in June, 1882. They appear to me to be a distinct species; in some respects they agree with *S. maculipes*, Tschek., but differ in the length of the 3rd segment and the aculeus, which is longer than usual in this genus, and the colour of the abdomen; in length of aculeus it comes nearer to *S. Holmgreni*, Tschek., but the legs are differently coloured and the head wider.

Sagaritis maculipes, Tschek.

Tschek., Ichn. Frag., 49, 6, ♂ ♀.

I have taken in this neighbourhood what I believe to be this species; it has also been bred by Mr. W. H. B. Fletcher from an unknown host. The cocoon is pearly white, with two indistinct zones of scattered black dots.

Cymodusa antennator, Holm.

Holm., Mon. Tryp. Suec., 41, 4, ♂ ♀.

Dr. Capron has taken the female of this species at Shiere; he also takes a male *Cymodusa*, which I identified as *C. flavipes*, Brischke. This Dr. Capron thinks is the male of *C. antennator*, Holm. It may be so, but it differs in many respects from the female; the head is not so wide, the face is wider, hind femora dark, and there is no trace of red on the abdomen of any I have seen (I have four males). Holmgren gives a variety of the male, "abdomen black, except the subtestaceous or red incision of 2nd segment, and hind femora entirely black"; this agrees exactly with Dr. Capron's males, and also a male which I took at Wimbledon. In a footnote Holmgren says that this variety is perhaps a distinct species. Dr. Capron remarks that he has taken no male of *C. antennator*, or female of *C. flavipes*; it is possible that these may be the sexes of the same insect.

Limneria mandibularis, Holm.

Holm., Mon. Ophion. Suec., 97, 76, ♂ ♀.

Dr. Capron has taken this very distinct species in the neighbourhood of Shiere. The head and thorax are very coarsely punctate, wings are without areolet, hind legs greater part black, aculeus and antennæ short, and transverse anal nervure divided, readily distinguishes it from the other species of this group of *Limneria*.

Limneria distincta, n. s.

Niger, metathorace excavato, pedibus posticis nigris tibiis basi et medio rufis.

Head transverse, scarcely contracted behind the eyes, rather wider than the thorax; antennæ not quite so long as the body;

face subquadrate, about the same width as the forehead. Thorax longer than high; mesonotum reticulate, with large close and rather shallow punctures; metanotum with a deep longitudinal furrow; lateral areæ subdivided; supero-medial area longer than broad, not closed behind, central groove is continuous from base to apex. Abdomen long and slender, more than one-third longer than the head and thorax, not so wide as the thorax; 1st segment longer than the hind coxæ and trochanters, petiole slender, about as long as the post-petiole, the latter rather more than twice as wide as the petiole, longer than broad, sides almost parallel; 2nd segment one-third longer than wide, 3rd quadrate, 4th, 5th, and 6th of equal length, one-third wider than long; abdomen pubescent at the sides and apex. Wings with a petiolated areolet; recurrent nervure received about in the middle of the areolet; external radial nervure almost straight; transverse anal nervure not divided.

Black; legs red, coxæ and trochanters black, middle femora with a black streak in the middle behind, hind legs black, tibiæ dull red, apex and before the base black, base of tarsal joints whitish, tarsi of middle legs the same colour, apex of middle tibiæ fuscous, calcariæ white. Stigma fuscous, base of wings and tegulæ yellow; mandibles and palpi yellow. Male. Length, 6 mm.

This appears to me to be a very distinct and undescribed species; the colour of the hind legs is different from any other of this group.

A single male was bred by Mr. W. H. B. Fletcher from *Gelechia lentiginosella* in July, 1886, taken in Abbott's Wood.

Dicolus subtiliventris, Fst.?

Fst., Ueb. d. Gatt. u. Art. d. Fam. d. Plectis., 96.

It is impossible to be sure that this is really Förster's species, because his description is so short: "Hind tibiæ distinctly notched before the apex, face dark brown, antennæ 31 joints, ♀"; all these points agree exactly with an insect taken by Mr. Bignell in the neighbourhood of Plymouth. Below I give a more detailed description of the insect:—

Head oblique behind the eyes; antennæ with long dense pubescence, a little longer than the body; head shining, very delicately punctured; clypeus small, semicircular, distinctly separated from

the face, the latter elevated in the middle. Thorax not so wide as the head, punctured as on the head, nearly three times as long as wide, not trilobed in front; metathorax with a transverse suture a little before the middle, without areæ, superior surface separated from the posterior surface by a prominent costa. Abdomen about as wide as the thorax and longer than the head and thorax, and widest towards the apex; 1st segment long and slender, about four times as long as wide, spiracles placed before the middle, post-petiole very little wider than the petiole; 2nd and 3rd segments of equal length, longer than wide; 4th cylindrical, one-fourth longer than wide; remainder transverse; the 2nd has an oblong perpendicular depression (? is this normal), with a slightly-raised ridge in the middle; aculeus straight, slender, and scarcely projecting. Legs slender, hind coxæ long, hind tibiæ with a wide notch before the apex. Wings without an areolet (very similar to *Hemiteles*); stigma moderate; external radial nervure curved, forming a slight S; transverse anal nervure of hind wings obsoletely divided just below the middle.

♀. Black; face partly piceous, antennæ reddish, paler beneath, palpi whitish, mouth and clypeus fulvous, thorax above partly piceous, prothorax at the sides and beneath, mesopleura and breast, fulvous-red; abdomen fusco-piceous; extreme apex of 2nd, all the 3rd, and middle of the base of the 4th segments stramineous, the 3rd fuscous at the sides; legs pale fulvous; front and middle coxæ and trochanters pale straw; hind coxæ with a slight fuscous mark on the outside towards the apex; apex of hind femora and tibiæ with a slight fuscous stain; base of wings and squamulæ stramineous. Stigma palish fuscous. Length about 5 mm.

Catoglyptus crassipes, Holm.

Holm., Mon. Tryph. Suec., 107, ♂ ♀.

Mr. Champion has taken a male of this species in the London district.

Catoglyptus pulchricornis, Holm.

Holm., Mon. Tryph. Suec., 109, 7, ♀.

Dr. Capron has taken two males of this species in the neighbourhood of Shiere: he says they differ from the female in having the antennæ entirely black, the legs rather darker, and the posterior coxæ entirely black. In one specimen the clypeus and face are yellowish white; in the other, a much smaller specimen, the inner orbits

only have a broad yellowish streak: the abdomen has the peculiar rugosity of the female.

Catoglyptus fuscicornis, Gmel.

Dr. Capron says that *Euryproctus* (*Mesoleptus*, Curt.) *Waltoni*, which he takes in the neighbourhood of Shiere, is the male of *C. fuscicornis*.

Perilissus minutus, n. s.

Niger, pedibus pallidis, coxis posticis nigris, scapo flavo, facie flavo-maculata ♀; facie genis et temporibus, thorace flavo-maculato ♂.

Head subopaque, sides slightly oblique behind the eyes, rather more so in the male than in the female; antennæ as long as the body. Thorax subopaque, very finely and closely punctate; mesonotum trilobed; supero-medial area of metathorax somewhat triangular, longer than wide, closed behind; lateral areæ obsoletely subdivided. Abdomen subopaque; 1st segment of female slightly rounded at the sides, tapering from base to apex, one-third longer than the width of the apex, spiracles almost in the middle and not distinct; 1st segment of the male much narrower, only about twice as wide at the apex as at the base, spiracles very prominent; both with a shallow furrow on the post-petiole; remaining segments transverse, the 4th the widest; aculeus slightly projecting and quite straight; legs rather slender. Wings with a large areolet, as in *Mesochorus*; recurrent nervure received before the middle; external radial nervure slightly curved; transverse anal nervure of hinder wings divided hardly below the middle, subopposite.

Black; palpi and greater part of mandibles yellow, frontal orbits yellow, and a fulvous blotch behind the eyes in the female; male mouth, face, frontal orbits, and cheeks yellow; scape yellow, black above in the female, base of flagellum beneath, remainder fuscous. Thorax of female black; in the male a yellow spot on the lower part of the prothorax, and another on the front part of the mesopleura; a line below the wings and front sutures reddish. Abdomen of the female, incisions of three first segments fulvous at the sides, wider and continued across the back in the male. Legs pale yellowish red; coxæ black; front coxæ yellow, base black; apex of middle pair yellowish (female); male almost entirely yellow, as well as extreme apex of hinder pair; trochanters yellow, hind pair of female reddish; hind tibiæ reddish white,

apex fuscous; apical joint of front and middle tarsi fuscous; hind tarsi fuscous, base of joints palish. Stigma pale fuscous; tubercles and tegulæ whitish. Male and female. Length, 5 mm.

Taken by Dr. Capron in the neighbourhood of Shiere. This species appears to come very near *P. nigricollis*, Thom., but the description is far too short to be certain: he makes no mention of the pale scape, partly black coxæ, or the reddish mark behind the eyes of the female.

Mesoleius attenuatus, n. s.

Niger, abdominis medio rufo, pedibus maxima ex parte rufis.

Head transverse, behind the eyes slightly oblique; antennæ filiform, longer than the body; apex of clypeus subtruncate. Thorax about one-third longer than high; mesonotum distinctly trilobed; metathorax without areæ; mesopleura scabriculous and dull, disc smooth and shining. Abdomen elongate, slender, longer than the head and thorax; apex of 4th segment the widest, nearly as wide as the thorax; 1st segment rather longer than the hind coxæ, petiole slender, sides parallel, about twice as long as wide; post-petiole rather longer than the petiole, apex very little wider than the petiole, finely scabriculous, apex shining, without canaliculà, spiracles placed before the middle; 2nd segment very finely scabriculous, about one-third longer than wide; 3rd, sculpture the same, longer than wide, about the same length as the 2nd; remainder transverse. Legs slender; last two joints of hind tarsi of almost equal length. Wings with an areolet; transverse anal nervure divided in the middle.

Black; face, mandibles, clypeus, and scape beneath yellow; segments 2—4 of abdomen red; tubercles and tegulæ yellow; stigma pale testaceous. Legs red; coxæ black, extreme apex of front and middle ones yellow; trochanters yellow, base of hind pair black; extreme apex of hind femora dark; hind tarsi and apical one-third of hind tibiæ nigro-fuscous. Ventral fold pale. Male. Length, 8 mm.

One male taken by Mr. E. Brunetti, who very kindly gave me the insect; it belongs to Sect. A of *Mesoleptus* of Holmgren's Mon. Tryph. Suec., which division he afterwards placed in the genus *Mesoleius* (Disp. Syn. Mesol. Scand.), and is very distinct from any of the group.

Mesoleius (*Saotus*) *? brevispina*, Thom.

Thom., Ent. Opus., 934.

Mr. J. E. Fletcher has bred several male Tryphons which agree better with this species than any other I can find; it is very similar to *Perilissus bicolor*, Brischke, but the teeth of the mandibles being of equal length will not allow it to go into that genus. The only difference that I can see from Thomson's description is that the calcariæ of the tibiæ are a trifle longer than one-third of the 1st joint of the tarsi. His descriptions are so very meagre that one can never be quite certain: in this he does not say if he knows the male. This group of *Mesoleius* have the abdomen more compressed and glazed than usual; some of the females are as much compressed as *Bassus cognatus*. I give a description of this insect:—

Head transverse, narrow behind the eyes; antennæ about as long as the body; apex of clypeus truncate, depressed, transversely raised before the apex. Thorax shining, parapsides obsolete; mesopleura obsoletely reticulate; supero- and postero-medial areæ subdistinct. Side of post-petiole of abdomen almost parallel longer than wide, depressed in the middle, basal depression obsoletely continued on to the post-petiole; 2nd and 3rd segments longer than wide, from the second segment abdomen subcompressed. Legs moderate. Wings without an areolet; transverse anal nervure slightly ante-furcal, divided far below the middle; transverse ordinary not interstitial.

Black; face, frontal orbits, the lower part of prothorax, mesopleura and breast, large hook-shaped marks on shoulders, a double mark in centre of mesonotum, tubercles, tegulæ, a mark below the wings, scutellum, or middle of scutellum, extreme apex of 1st segment, apex broadly of 2nd, a dorsal mark on 3rd margin of the remainder thinly, belly, front leg, hind coxæ, and trochanters yellow; hind femora red; base of hind tibiæ dirty white, apical half and hind tarsi fuscous; stigma fuscous. Antennæ fuscous above, reddish beneath. The pale marks on the abdomen vary a little in quantity. Male. Length, 5 mm.

Bred by Mr. J. E. Fletcher from *Nematus purpuræ*, Cam., a new leaf-rolling sawfly, discovered by him at Worcester on *Salix purpurea*, June, 1886.

Mesoleius flavopictus, Gr.

Mesoleptus flavopictus, Grav., I. E., ii., 33, ♂ ; *Mesoleius*, Bris., D. Ich. d. Prov. W. u. O-Preuss, ♂ ♀ .

Mr. Champion has taken, at Caterham, a female which agrees exactly with Gravenhorst's male, except that the hind coxæ are entirely red. It differs slightly from Brischke's description: he says all the coxæ are red, the supero-medial area of the metathorax indistinct, and transverse anal nervure divided in the middle. Mr. Champion's insect has the supero-medial area rather distinct, elongate, with almost parallel sides, and transverse anal nervure divided a little below the middle; but this is of very little consequence, as all these points are subject to variation. Mr. Marshall has placed *flavopictus* in the genus *Perilissus*.

Grypocentrus cinctellus, Ruthe.

Ruthe, Stett. ent. Zeit., xvi., 54, 1; Holm., Mon. Tryph. Suec., 193. ♀ .

Dr. Capron has taken this species in the neighbourhood of Shiere.

Thymarus compressus, Thom.

Thom., Opus. Ent., 909, ♂ ♀ .

Dr. Capron informs me he has taken this species in the neighbourhood of Shiere.

Lathrolestus macropygus, Holm.

Perilissus macropygus, Holm., Mon. Tryph. Suec., 126, 12, ♂ ; *Lathrolestus macropygus*, Thom., Opus. Ent., 917, ♂ ♀ .

This handsome little insect has been taken by Mr. Champion at Aviemore; the female, which Thomson says is *Perilissus soleatus*, Holm , has not yet been taken in Britain that I know of. *L. macropygus* has since been taken by Dr. Capron in the neighbourhood of Shiere.

Polyblastus sanguinatorius, Ratz.

Ratz., Die Ichn. d. Forst., iii., 129, 51 ; Holm., Mon. Tryph. Suec., 213, ♀ ; Brischke, D. Ich. d. Prov. W. u. O-Preuss, 65, ♂ ♀ .

Mr. W. H. B. Fletcher has bred a specimen of this lovely little *Tryphon* from an unknown host. Ratzeburg says that Brischke bred a male from *Cladius eucera* ; Brischke says that it was bred from *Cladius viminalis* and *Nematus* larvæ. The *Tryphonidæ* frequently infest sawfly larvæ, and in all probability Mr. Fletcher introduced the larva of a *Cladius* or *Nematus* with the food-plant into his case.

Cteniscus gnathoxanthus, Gr.

Tryphon gnathoxanthus, Gr., Ich. Eur., ii., 147, 94, ♀ ;
Cteniscus gnathoxanthus, Holm., Mon. Tryph. Suec., 231, 12, ♂ , ♀ .

Mr. Bignell has taken a female of this very distinct species in Devonshire.

Triclistus (*Exochus*) *Holmgreni*, Bohm.

Holm., Disp. Met. Exoch. Scand., 57, 1, ♀ .

Dr. Capron has sent me this insect, which he has taken at Shiere. Holmgren says it is very rare.

Triclistus lativentris, Thom.

Thom., Deuts. Entom. Zeits., xxxi. (1887), 203, 3, ♂ ♀ .

A single specimen of this was bred in May, 1884, from *Emmelesia alchemillata* by Mr. W. H. B. Fletcher.

Triclistus nitifrons, Thom.

Thom., *l. c.*, 204, 6, ♂ ♀ .

This I took on Mousehold, near Norwich, in August, 1877, and had considered it *T. congener*.

Triclistus pubiventris, Thom.

Thom., *l. c.*, 205, 8, ♂ ♀ .

Taken at Earlham, near Norwich, in June, 1878. This I considered *T. podagricus*.

Exochus niger, mihi.

Trans. Ent. Soc. Lond., 1883, 169.

Thomson says this is a *Triclistus*, although the wings have no areolet.

Exochus Woldstedtii, Holm.

I have taken the male of this insect at Earlham, in the neighbourhood of Norwich, in June, 1886.

Exochus nigripalpis, Thom.

This species is common in this country. I had considered it *E. graripes*, but Thomson says it is his *nigripalpis*.

Exochus procerus, Holm.

Holm., Meth. Exoch. Scand., 68, 11, ♂ ♀.

I have a specimen of this insect: unfortunately it has no locality or number to it, so I am unable to say from whom I received it; all I can say is that it is British.

Bassus deplanatus, Gr.

Mr. G. C. Champion has taken a male *Bassus* at Aviemore which agrees very closely with *B. deplanatus*, Gr., but Gravenhorst says that the scape of the antennæ is red or ferruginous, towards the apex brownish or blackish, and the front coxæ black, more or less red beneath. In Mr. Champion's specimen the former are entirely black, and the latter entirely red. Holmgren gives the same description, and says the transverse anal nervure is divided a little above the middle; in the Scotch specimen it is divided in the middle. It is larger, measuring 8 mm.; Holmgren and Gravenhorst give the length $2\frac{1}{2}$—3 or almost 3 lines. It is probably only a large var. of the *B. deplanatus*, Gr.

Bassus punctatus, n. s.

Niger, pedibus rufis basi nigris, posticis tarsis et tibiis apice nigris, scutello flavo limbato; areola nulla.

Subopaque; head transverse, rather narrowed behind the eyes, finely punctate, interstices reticulate; antennæ about two-thirds the length of the body. Thorax punctate, interstices reticulate

metathorax without areæ. First three segments of abdomen punctate, interstices reticulate; apex of 3rd free from punctures; base of 4th punctate, the remainder reticulate; 1st segment a little longer than wide, sides almost parallel; 2nd transverse. Legs moderate. Wings without an areolet; transverse anal nervure divided a little below the middle.

Black; a yellow mark in middle of the face, an oblong mark in front of wings, a streak below, sides and extreme apex of scutellum yellow. Legs red; coxæ, base of trochanters, apex of hind tibiæ and hind tarsi black; apical joint of front and middle tarsi fuscous. Tegulæ and base of wings yellow; stigma fuscous, extreme base slightly paler. Female. Length, 7·5 mm.

One female taken by Mr. G. C. Champion at Aviemore. This *Bassus* appears to be undescribed; the colour of the scutellum and coxæ, as well as the sculpture of the base of the abdomen, is distinct from any I can find described.

Ephialtes ruficollis, Desvig.

Desvig., Mus. Cat. Brit. Ichn., 88, 11.

The Rev. T. A. Marshall has placed this insect in his catalogue as a synonym of *Thalessa clavata*, F., but this is a mistake; it is a true *Ephialtes*. I have a male and female bred by Mr. C. G. Barrett many years ago. The transverse ordinary nervure is interstitial, and the transverse anal almost opposite and divided in the middle; the male has a narrow testaceous band at the base of the 2nd and 3rd segments.

If *Thalessa clavata* is included in the catalogue on the strength of Desvignes' insect, then it must be removed from the British list.

Pimpla nigricans, Thom.

Thom., Opusc. Ent., 754, 23, ♂ ♀.

Mr. Champion has taken, at Box Hill, a *Pimpla* which I believe to be this species. Thomson says it differs from *P. detrita*, Holm., in having the tubercles black, and the 5th joint of the tarsi not longer than the 3rd; besides these points the 1st segment of the abdomen is a little shorter and the aculeus a little longer.

Polysphincta gracilis, Holm.

Holm., Mon. Pimp. Suec., 32, 8, ♂ ♀.

Mr. Champion has taken a female of this very distinct species at Aviemore.

Polysphincta subrufa, n. s.

Niger, thorace subtus pedibusque rufis, tibiis posticis fuscis variis; aculeo segmento primo longitudine.

Shining; antennæ rather more than three-fourths the length of the body; head moderately narrowed behind; mesonotum obsoletely trilobed in front; metathorax with three distinct superior areæ; 1st segment of abdomen about as long as the width of the apex, keels distinct, extending to beyond the middle of the segment, this and the 2nd obsoletely scabriculous; 2nd and 3rd segments with a transverse impression; the remaining segments smooth and shining; aculeus as long as the 1st segment (about one-fifth the length of the abdomen), and stout. Radial cell of wings lanceolate, one-third longer than the internal division of the radial nervure; transverse anal nervure divided a little below the middle, the emitting nervure not very distinct.

Black; clypeus and mandibles dirty white, apex of latter brownish; the lower half of the mesopleura, metathorax beneath, breast, and legs red; base of hind tibiæ paler, apex and before the base fuscous; apex of middle tibiæ and apex of joints of middle and hind tarsi fuscous, their last joints entirely so. Stigma palish brown, base pale; tegulæ yellowish white. Length about 6 mm.

One female taken by Mr. G. C. Champion at Aviemore, and another by Mr. E. A. Atmore at Lynn in June, 1887.

This beautiful insect belongs to Holmgren's division A. b. †, but differs in colour and structure from any *Polysphincta* I can find described. It seems to me to come nearest to *P. percontatoria*, Müll.

Glypta elongata, Holm.

Holm., Mon. Pimp. Suec., 38, 6, ♀.

I took a female of this species at Brundall in July, 1881. Last year Mr. W. H. B. Fletcher bred it from the larvæ of *Bactra lanceolana* from Worthing, in July; it is very like *G. fronticornis*, but the head behind the

eyes does not slope towards the neck. It appears to vary in colour; the single male Mr. Fletcher bred has the margins only of the abdominal segments obscurely red, the coxæ reddish brown, apex of hind femora, base and apex of hind tibiæ, and apex of tarsal joints, brownish. The abdomen of the female also varies in colour to almost entirely black: one has the coxæ reddish brown. *G. fronticornis* I have not yet seen: either agree very well with Gravenhorst's description of *G. fronticornis*.

Glypta rufata, n. s.

Abdomine rufo apice infuscato, pedibus rufis, aculeo abdominis longitudine.

Shining, punctate; head transverse, narrow behind the eyes; antennæ three-fourths the length of the body; mesonotum slightly trilobed in front; metanotum shining, transversely rugose, with five more or less distinct areæ; mesopleura shining, punctate, punctures very much scattered behind; 1st segment of abdomen rather longer than wide, keels distinct for two-thirds the length of the segment, obsolete towards the apex; 2nd and 3rd segments about one-fourth broader than long; aculeus scarcely shorter than the abdomen. Wings without an areolet; transverse anal nervure divided below the middle, one-third from the bottom. Claws of tarsi pectinated.

Black; apex of clypeus and palpi piceous; flagellum beneath red. Abdomen red; apical segments more or less fuscous; the others usually with transverse fuscous stains, generally faint. Legs red; hind tibiæ at the apex and before the base slightly fuscous; apex of joints of hind tarsi fuscous, more or less intense. Stigma of female pale, male pale fuscous, squamulæ red; base of wings yellow. Male and female. Length, 5—6 mm.

Bred by Mr. W. H. B. Fletcher from *Eupœcilia notulana* from Wicken Fen, in June, 1886.

This very distinct species, in coloration, is somewhat like *G. monoceros*, but the forehead is not *cornuted*, the legs are differently coloured, and the claws pectinated.

Lissonota formosa, n. s.

Niger; thorace rufo-flavoque maculato, aculeo corpore paulo breviore, pedibus rufis.

Head transverse, behind the eyes oblique, but less so than in *L. variabilis*; antennæ not so long as the body. Thorax punctate;

mesonotum more finely punctate than the metanotum, and a little more coarsely so than in *variabilis*; punctures less distinct than on the latter, with a rather distinct central depression; 1st segment of abdomen about one-third longer than wide; 2nd and 3rd longer than wide; these three segments rather strongly punctate, the apical margins shining; 4th more finely punctate; aculeus about as long as thorax and abdomen. Wings as in *L. variabilis*.

Black; mouth, clypeus, and inner orbits yellow; mesothorax entirely; scutellum, back part of prothorax and sides of metathorax, red; a line on the upper part of the prothorax, a line at the sides above the front coxæ, a triangular mark on the shoulders and tubercles, yellow. Apical margins of 1st—3rd and sides of 3rd—7th segments of the abdomen castaneous. Legs red; front and middle coxæ and trochanters yellow; hind trochanters fuscous above; middle and hind tarsi slightly fuscous. Base of wings and tegulæ pale yellow; stigma pale testaceous. Length, 5 mm.

One female was bred in 1886 by Mr. G. T. Porritt from either *Rhodophæa consociella* or *Nephopteryx genistella*.

This insect is very like *variabilis* and *lateralis*, but differs from both beside in the rich coloration, from the former in the punctate abdomen, and from the latter in the longer 2nd and 3rd segments of the abdomen.

Echthrus lancifer, Gr.

Gr., I. E., iii., 867, 22, ♀; Tasch., D. Schluf. Pimp., 303, 2, ♀; Brischke, D. Ich. d. Prov. W. u. O-Preuss, 1880, 21, ♂ ♀.

Mr. Billups took a fine female at Walmer, August 5th, 1886, which he very kindly presented to me.

Echthrus nubeculatus, Gr.

Gr., I. E., iii., 866, 20, ♂ ♀.

Mr. G. C. Champion has taken a female of this species at Aviemore. The head, thorax, and abdomen are closely and coarsely punctate.

XVIII.—*On a new genus of South African* Pselaphidæ.

By Thos. L. Casey. (Communicated by Dr. D. Sharp.)

[Read September 7th, 1887.]

The genus here brought to notice belongs to the group *Faronides*, distinguished by the claws, which are two in number, and equal or very nearly so. The general characters being those of the *Euplectini*, the following diagnosis will be sufficient for purposes of identification :—

Faronidius, n. g. (*Euplectini*).

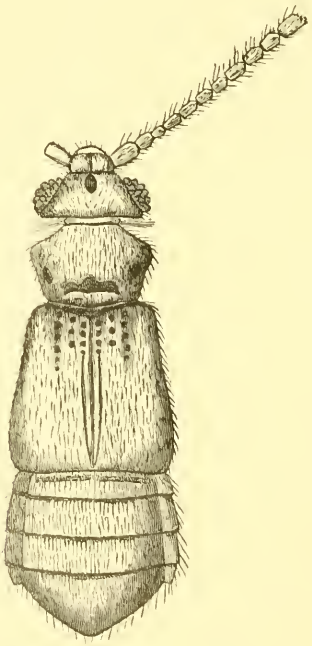
Head transverse; eyes very large, prominent, situated at the base; genæ almost entirely obsolete; front with a single deep fovea; antennæ long, slender, not capitate, approximate at base, inserted at the sides of a frontal tubercle, which is divided by a distinct groove, first joint as long as the next two together; maxillary palpi small, fourth joint as long as the preceding joints combined, ovate, slightly truncate at tip. Under surface of the head with two impressed foveæ near the base, connected by a deeply impressed transverse groove, and also having a dense fringe of long erect setæ at each side of the basal margin. Prothorax with a large transverse basal impression and lateral foveæ not connected. Elytra more than twice as long as the prothorax, each elytron having at base three parallel rows of small deep foveæ, the sutural striæ being continous from the fourth fovea of the inner series. Abdomen distinctly shorter than the elytra; border wide, inclined; first visible dorsal segment shorter than the second, having near the base a transverse line of spongiose structure, which is slightly interrupted in the middle. Prosternum with a deep transverse groove nearly throughout its width. Elytra without lateral foveæ or carinæ. Legs and tarsi slender.

The systematic position of this genus appears to be in the vicinity of *Sagola*, Sharp, which it resembles in the structure and position of the antennæ, but from which it differs greatly in the structure of the under

surface of the head, and in the number and relative position of the frontal and prenotal impressions.

Faronidius africanus, n. s.

Form slender, linear, depressed; integuments feebly shining, pale rufo-ferruginous throughout; pubescence long, fine, very dense, subrecumbent. Head slightly narrower than the prothorax, wider than long; base transversely truncate; eyes very large and prominent from above; front with a deep rounded fovea in the



middle of the length and in a line through the anterior portion of the eyes; it is continued anteriorly by a narrow deep canaliculation which bisects the frontal tubercle; the latter transverse, abrupt behind; antennæ slighly more than one-half as long as the body; third joint small, remainder longer than wide, obconical; eleventh slightly more robust, slightly shorter than the two preceding together, with an oblique process at apex. Prothorax widest at one-third its length from the apex, much wider than long; sides strongly rounded anteriorly, feebly convergent and very slightly sinuate towards base; the latter transverse, abruptly and slightly

arcuate in the middle, one-half wider than the apex; disk evenly convex anteriorly; basal impression large and deep. Elytra at base slightly wider than the prothorax; sides more strongly arcuate near the apex; disk depressed, distinctly longer than the head and prothorax together. Abdomen slightly shorter than the elytra, equal to the latter in width. Length, 1·5 mm.

Wellington, South Africa.

The structure of the vertex is somewhat peculiar, the median tubercle being connected with the anterior margin of the clypeus by a corneous band, which appears at first sight to be a strongly elevated carina, but which is in reality entirely detached from the vertex, except at its point of origin on the tubercle and clypeus. The type is a female, the apex of the abdomen beneath being unmodified; it is the only representative which I have seen.

XIX. *On the butterflies of the French Pyrenees.*

By H. J. Elwes, F.L.S., F.Z.S., &c.

[Read October 5th, 1887.]

It is a curious fact how little attention has been paid by English lepidopterists to the butterflies of Europe generally. It is not so in all branches of Natural History, and, as regards birds, I may say that there is hardly a country in Europe on which able ornithological memoirs are not to be found in the pages of 'The Ibis'; whilst on European butterflies there is hardly a paper of real importance in any English entomological journal. The only two general works on European butterflies by Englishmen, namely, Kirby's 'European Lepidoptera' and Lang's 'Butterflies of Europe,' are mere compilations, without much original observation or special knowledge of the subject, and only of use to beginners.

Though I cannot pretend that the present paper is anything more than a preliminary list, yet, as there is, so far as I know, no complete catalogue of Pyrenean butterflies in existence, I hope it may have some interest to the members of the Society. And, in order to make my notes more useful, I have included the names of species found by M. de Graslin, Struve, and MM. Réné and Charles Oberthür, who have all written on the Pyrenean Lepidoptera. To M. Charles Oberthür I am not only indebted for much kind guidance and assistance during the time I was at Vernet, but also for looking over and correcting the list I drew up, which his ten or twelve years' experience in the Pyrenees enabled him to do with some confidence in its accuracy.

The works I have consulted in writing this paper are as follows:—

A. de Graslin, 'Notice sur deux Explorations Entomologiques faites dans les Pyrenées Orientales en 1847 et en 1857.'

'Annales Soc. Ent. France,' 1862, pp. 297—372.

This contains a long list of 87 butterflies and about 440 species of moths (excluding Micros), taken at Collioure, on the coast of the Mediterranean, at Vernet, and at Mont Louis, with numerous critical remarks on the localities, and on the larvæ, to which M. de Graslin appears to have paid particular attention. Some new species are figured.

Oscar Struve, 'Drei sommer in Pyrenaën.'

Stettiner 'Ent. Zeit.' 1882, pp. 398—405, 410, 429. This paper gives an account of the localities visited by the author in 1879 in the Western and Central Pyrenees, where, however, he does not seem to have got any great results, owing to frequent change of locality and bad weather, and a list of the Lepidoptera, 92 species of butterflies and 176 of moths (excluding Micros), found by him during 1880 and 1881 at Vernet and Mont Louis, in the Eastern Pyrenees.

Charles Oberthür, 'Lepidoptères des Pyrenées.'

'Etudes d'Entomologie, Huitième Livraison,' Juin 1884, Rennes. A whole part of M. Oberthür's beautifully-printed and illustrated 'Etudes' are devoted to Pyrenean Lepidoptera, mostly from Cauterets, in the central part of the range, and from the Picos d'Europa, an extension of the Pyrenees in Northern Spain, which MM. Oberthür were the first entomologists to visit. This paper contains no general catalogue, but notes on a number of species, and good figures of several, and has been of great use to me in making up my list.

Leaving London, with my wife, on the 28th June, I travelled, *viâ* Paris and Toulouse, direct to Vernet les Bains, a watering-place in the Department of the Pyrenées Orientales, which has been better worked than any other place in the Pyrenees, and is, on account of its situation near the shores of the Mediterranean, its warm climate, and its position close under Mont Canigou, the highest point in the eastern part of the range, perhaps the richest field for an entomologist in the South of France. Here we found comfortable quarters and excellent cooking at a very much lower rate than in the Central and Western Pyrenees, which are more frequented by tourists and bathers. Though not so easy of access as Luchon or Cauterets, Vernet is only seven miles from the railway at Prades, and a very good centre for excursions. The rainfall is much less, the weather

more settled, and the climate, though hotter, not more oppressive than that of the low valleys in the Western and Central Pyrenees. Though the elevation of the village is only 2000 feet, and the character of the immediate neighbourhood somewhat dry and arid, yet, by riding or walking up the valley, at the foot of which Vernet lies, you soon get into woods and pastures of an alpine character, and have less distance to go to the good collecting spots than at any of the other places which I visited, except Gavarnie.

The species found at Vernet are a curious mixture of Mediterranean forms, such as *Rhodocera Cleopatra*, *Anthocharis euphenoides* and *Thais medesicaste*, with purely alpine and arctic ones, such as *Colias phicomone*, *Lycæna orbitulus*, *Erebra Lappona*, and *Argynnis pales*. It would be possible to take all these in a single day by ascending about 4000 feet.

Though some of the more southern forms were over or past their best when I arrived, yet I think the month of July, or from June 15th to July 15th, is the best month all round for collecting, and, though a few species, such as *Erebia neoridas* and *E. pitho*, do not appear till later; yet I got almost all the Rhopalocera that Oberthür, Struve, and De Graslin collected in the course of several years. The Heterocera, of course, I could not hope to do much with in so short a time, though I took many interesting species, and have no doubt that much remains to be learnt of those which frequent the higher elevations, which, owing to the difficulty of getting tolerable quarters, have been comparatively neglected by all collectors. If Messrs. Oberthür carry out their intention of building a châlet at about 6000 feet, they will be well repaid both by night and by day; but, strange to say, not a single high mountain inn of the class so common in the Alps is yet to be found in the Pyrenees, and one must take one's choice of a long ride up the mountain and down again at night, or of lying out in some of the few and dirty châlets which exist at or above 5000 feet.

After spending twelve days at Vernet, we went on to Bagneres de Luchon, where the weather was very unsettled during the seven days we remained, and, though I lost no chance of working the higher ground, I had several days spoilt by heavy thunderstorms and

deluges of rain. The vegetation is here much more luxuriant, the forests larger and finer, and the climate of the higher valleys damper and less sunny than at Vernet. Directly one crosses the watershed between the Mediterranean and the Bay of Biscay, as you do in travelling by rail from Toulouse to Luchon, the change from the arid vineyards, wheat-fields, and olive-gardens of Roussillon to the green pastures, beech-woods, and maize-fields of Bearn is very marked. I have therefore marked all the species I noted which occur in the Eastern and Central Pyrenees, or both of them, with an E. or C., to show the distribution as far as I know it.

From Luchon we went on to St. Sauveur and Gavarnie, which latter I found a very charming place, both for scenery and collecting, and concluded our trip by ascending the Pic du Midi de Bigorre, where I was astonished by taking *Lycæna bœtica*, *Erebia Lappona*, *Lycæna orbitulus*, and *Rhodocera rhamni*, all within a few yards of each other, at about 8000 feet elevation.

The return journey was made *viâ* Bayonne and Biarritz, where I stayed part of two days, and found common, in the marshes near the town, several species, such as *Satyrus phædra*, *Cœnonympha œdipus*, *Lycæna alcon*, and *Cyclopides morpheus*, which I had never previously taken either in Germany, Switzerland, or the Pyrenees.

In the enclosed list I have given my authority for all species not taken by myself, and have marked with a ? a few which seem to have been included by others on doubtful authority. An exploration of the Spanish side of the mountains will doubtless add several species to this list. The elevations at which the various species occur are, of course, only approximate, but are in some cases interesting, as showing how high up some of the southern species occur; *Anthocharis cuphenoides*, for instance, which is a vernal species on the Mediterranean coast, goes up to 6000 or 7000 feet in July, whilst *R. rhamni*, a vernal and autumnal species with us, was fresh out in July at 7000—8000 feet in the Central Pyrenees.

1. *Papilio podalirius.* E. C. To about 3000 ft.—I did not take the type, which, according to Oberthür, is found in the central and probably in the western parts of the chain. The variety *Feisthameli*, Dup., is common at Vernet in July and August, but of the first generation, which occurs in May there, some specimens given me by M. Oberthür are as yellow as the ordinary *podalirius* from Germany and Brittany, and others are as white as *Feisthameli* from Collioure and Andalusia. If these specimens are bred from the same batch of eggs it would seem that the variety is not constant. De Graslin says that the larva of *Feisthameli* is not different from that of *podalirius*.
2. *Papilio machaon.* E. C. To 5000 ft.
3. *Thais rumina*, var. *medesicaste.* E. To 2000 ft. May—July.
4. *Parnassius apollo.* E. C. 3—5000 ft. June, July.
5. *P. mnemosyne.* E. C. 4—5000 ft. June, July.—I found this common in July in the shady wooded glens on the north side of the slope at the Col du Cheval Mort, and endeavoured again without success to discover the food-plant of its larva. No species of *Corydalis* was, however, to be found in the places where it was most abundant.
6. *Aporia Cratægi.* E. C. Common at 3—4000 ft., and up to 6000 ft.
7. *Pieris brassicæ.* E. C. To 4000 ft.
8. *P. rapæ.* E. C. To 7000 ft.
9. *P. napi.* E. C. To 6000 ft.
10. *P. callidice.* E. C. 6—9000 ft. June,—July.—I found it wherever I went above 6000 ft., and see no difference between Pyrenean and Alpine specimens.
11. *P. daplidice.* E. C. To 2000 ft. Not abundant.
12. *Anthocharis euphenoides.* E. C.? Common to 5000 ft. at Vernet. May—July.—I am almost positive that I saw this species at 7000 ft., near the Port d'Espagne, above Gavarnie, but was unable to take it.

A. Belia, var. *ausonia*, occurs at Collioure on the coast, but not as in the Alps and Himalaya in the mountains.

A. tages, var. *bellezina*.—M. Oberthür notes this on my list as occurring in the Eastern Pyrenees, but does not say whether on the coast or in the mountains.

13. *A. cardamines*. C. To 5000 ft. July.—Not observed in the Eastern Pyrenees, but found at Luchon and Cauterets.
14. *Leucophasia sinapis*, and var. *diniensis*. E. C. To 6000 ft. May—July.
15. *Colias edusa*. E. C. To 5000 ft. June, July.
16. *C. phicomone*. E. C. 6—8000 ft. July.—Very abundant above Vernet.
17. *C. hyale*. E. C. July—August.—I did not observe this, but M. Oberthür says it is common at Vernet in August.

    C. chrysotheme is noted by Struve as occurring at Vernet, but I think he must mean what I took, and De Graslin notes as "*C. edusa* variety approaching *chrysotheme*." These were small pale forms of *edusa*, which occurred at the same time and place as the large brilliant ones which are typical of hot sunny climates. I am not aware that *C. chrysotheme* occurs anywhere west of the Tyrol, where, I think, it was once reported by G. Mann.
18. *Rhodocera rhamni*. E. C. 2—8000 ft. March—June, *fide* de Graslin; July, Elwes.
19. *R. Cleopatra*. E. 1—2000 ft. June, July.—Common at Vernet.
20. *Thecla betulæ*. E.—I procured a specimen of this taken at Vernet by Michel Nou. Neither de Graslin or Struve note it.
21. *T. spini*. E.—Noted by de Graslin at Villefranche, just below Vernet. I took a female of the form *Lynceus* at Vernet.
22. *T. ilicis*, and vars. *æsculi* and *cerri*. E. C. 1—3000 ft. June, July. — Common at Vernet. Neither the var. *cerri*, which, according to Oberthür, exists in both sexes in France, or the var. *æsculi*, which, according to Staudinger, is a southern variety, seem to me quite worthy of separation.
23. *T. acaciæ*. E. To 3000 ft. June, July.—Not so common as the last, but occurs early in July at Vernet.
24. *T. roboris*. E. 1—3000 ft. June, July. — This fine species is common at Vernet in several places; it settles on ash and chestnut trees, and is not difficult to catch in good condition at the beginning of July. On some of the low trees at the

head of the valley of St. Vincent it was so numerous that I caught twenty in an hour or so, and, when disturbed, it usually returns to the same perch.

25. *T. rubi.* E.—I did not observe this myself, but procured specimens from Michel Nou, taken at Vernet. De Graslin says it is very common at Collioure, and the specimens I have from there have a median line of white spots on hind wings below, which is more marked than in those from any other locality.

? *T. quercus.* E.—Noted by Struve at Vernet, but never seen by Oberthür, who has collected several years there.

26. *Polyommatus virgaureæ.* E. C. 3—6000 ft. June, July.—The var. *Meigii*, which differs from the type in having more or less of the black spots of the lower surface showing through the copper of the wing above, occurs in the Pyrenees, but only, I think, as an aberration, and, though it seems more abundant and well-marked in Central Spain, it can hardly be looked on even there as a constant variety.

27. *P. hippothoe.* E. C. 3—6000 ft. July.—Not uncommon in moist pastures.

28. *P. alciphron*, var. *gordius.* E. C. 2—3000 ft. June, July.—Common at Vernet; also found at Cauterets.

29. *P. dorilis.* E. C. Var. *subalpina.* E. To 6000 ft. June, July.—Not common. Those which I took, as also noted by Oberthür, are like the common form; but Struve notes also the var. *subalpina* as occurring at Vernet. I do not think this variety can be separated in the Pyrenees.

30. *P. phlæas.* E. C. To 5000 ft.

31. *Lycæna bætica.* E. C. To 8000 ft. May—July.—Not noted by De Graslin, but taken by Struve and myself at Vernet, and by me at Gavarnie and on the Pic du Midi at 8000 ft. This latter specimen had one fore wing so much crippled that it seemed hardly capable of having flown up so high from below; and, as the species occurs at considerable elevations on the Himalaya, it may be an inhabitant of the higher Pyrenees.

L. argiades. W.—Not noted by any one from the mountains, but, as I took it at Biarritz, it most likely occurs in the lower parts of the Western Pyrenees.

32. *L. ægon.* E. C. To 6000 ft. June, July.—Common almost everywhere.
33. *L. argus.* C. *Fide* Oberthür.—Not seen by either De Graslin or Struve, but noted at Cautarets with *ægon* by Oberthür; and I took one or two at Gavarnie, which I believe to be *argus*.
34. *L. orion.* E. 1500 ft.—Not seen by me, but noted by de Graslin at Villefranche.
35. *L. baton.* E. 1500 ft. — Not seen by me, but specimens taken at Vernet by M. Nou were intermediate between the type and the var. *panoptes*, which I have from Collioure, on the coast. Struve notes both the type and *panoptes* at Vernet.
36. *L. orbitulus.* E. C. 6—8000 ft. July.
37. *L. pyrenaica*, Bdv. C. 6—8000 ft. July. *Cf.* Ob., Et. Ent. Liv., viii. p. 16.—With regard to this species, Oberthür has cleared up some of the doubt which existed as to *pyrenaica*, and, whether it is treated as a distinct species or only as a variety, it seems to be quite easy to distinguish not only from *orbitulus* of the Alps, but also from the form found with it in the Central Pyrenees. In the eastern part of the range alone I found it at Gavarnie and on the Pic du Midi, whilst *orbitulus* was common above the forest, by the track from Vernet to the Pla Guilhelm. My collection contains a good series of the forms of this species, and, though I cannot agree with Oberthür in all points, yet I think the arrangement given in Staudinger's Catalogue may be amended as follows:—

L. orbitulus, Prun., Sum. Alp. Pyr. Altai, Alatau, Tarbagatai.
? Var. *rustica*, Edw. Colorado.
? Var. *podarce*, Feld., *tehama*, Reak., *nestos*, Bdl. Wash. terr., California, U.S.A.
Var. vel. sp. *aquilo*, Bdl. Lapland. Minor ♀ *cærulescens*.
? Var. *Wosnesenskyii*, Men. Kamschatcha, non vidi.
Var. vel. sp. ? *Franklini*, Curt. Labrador, Arct. Am. Subtus distincte nigro-punctatus.

Var. vel. sp. *pyrenaica*, Bdv. Cent. Pyr., N. Spain (Picos d'Europa). (*Orbitulus* and *pyrenaica*, "species valde distincta," *fide* Oberthür). ?= *Dardanus*, Frr., As. min. alp. Armenia; (Sierra Nevada, Andalusia, (*fide* Stgr.).

Var. vel. sp. *Leela*, de Nicé., J. A. S. B., 1883, p. 66, t. 1, fig. 3, 3*a*. Ladak.

L. Ellisi, Marsh., from the N.W. Himalaya, is an allied species nearest to *Leela*. *Pheretiades*, Ev., from the Alatau and mountains of Kuldja seems distinct. *Pheres*, Stgr., *Pheretulus*, Stgr., and *Pherulus*, Stgr., from the mountains of Khokand, seem, as far as I can judge from the few specimens I have, to be all the same species; but, in any case, the name of *Pheres* has been used by Boisduval for a Californian *Lycæna*. The Colorado form, *rustica*, Edw., is so near our alpine one that I can hardly separate it, but that found in California and Washington territory, *tehama*, Reakirt, is much more distinct, pale below, and much spotted with black. Edwards considers it distinct from *orbitulus*. The type of *Franklini* came from Arctic America, and is said by Oberthür to be almost identical with *aquilo*. Whether the Labrador form is identical with *Franklini* or not I cannot say, but it is very distinct on the under side from the form found on the fells of Lapland, which I take to be *aquilo*, Bdv. *Wosnesenskyii* I know only from the figure. *Agagrus*, Christoph, from the Alps of North Persia, is nearly allied to *orbitulus*, and may perhaps be considered only as a well-marked local form; but I have seen it only from one locality, and do not know whether it varies. The distribution of the forms of this species at many isolated points in the high alpine and arctic regions of the Palæarctic and Nearctic region is very curious, and worthy of a more detailed study.

38. *L. eros*. E. C. 4—5000 ft.—Rare in the Pyrenees, where I have not taken it myself.

Var. ♀, *cæruleseens*, Ob. C.

39. *L. icarus*. E. C. To 5000 ft.

40. *L. eumedon*. E. C. 4—6000 ft. July.

41. *L. escheri*. E. C.? 1—3000 ft. July.
42. *L. astrarche* (*medon*). E. C. 2—3000 ft. July.—I only took it at St. Sauveur, but Struve notes it at Vernet.
43. *L. bellargus*. E. C. 3—5000 ft. July.
44. *L. amanda*. E. C. 2—3000 ft. June, July.—Not common and local. I took it only at the ruined monastery of St. Martin du Canigou, near Vernet, and at St. Sauveur.
45. *L. corydon*. E. C. 3—4000 ft. July.
46. *L. hylas*. E. C. 2—3000 ft. July.
47. *L. argiolus*. E. C.—Common at Biarritz; taken at Vernet.
48. *L. minima*. E. C. 1—3000 ft.—Seems rare in the Pyrenees at low elevations only. In the Alps up to 7—8000 ft.
49. *L. semiargus*. E. C. 2—6000 ft. June, July.
50. *L. melanops*. E. 1000 ft. April.—Only mentioned by de Graslin, who took it at Villefranche. I have taken it at Sion, in the Valais, in May, though it is not included in Frey's 'Lepidoptera der Schweiz.'
51. *L. arion*. E. C. To 5000 ft. June, July.
52. *Nemeobius lucina*. E. C.? 3000 ft. June.—I only procured this from Michel Nou at Vernet, and never saw it myself, probably because I was too late.
53. *Libythea celtis*. E. 2000 ft.—Struve found this in the valley of St. Vincent, near Vernet.
54. *Limenitis camilla*. E. C. 2—4000 ft. July.—Not uncommon in various places on bramble flowers.
55. *Apatura iris*. C. 2000 ft. July.—Only seen by me at Luchon, where alone Oberthür also took it.
56. *A. ilia*, var. *clytie*. C. 2000 ft. June, July.—Common at St. Sauveur, but seen nowhere else.
57. *Vanessa c-album*. E. C. 1—3000 ft.—Common at Vernet and Luchon in July.
58. *V. polychloros*. E. C.? 2000 ft. July.—Only taken at Vernet, where it was rare.
59. *V. urticæ*. E. C. To 8000 ft. July.
60. *V. io*. E. C. To 5000 ft.
61. *V. antiopa*. E. C. 2—3000 ft.
62. *V. atalanta*. E. C. To 5000 ft.
63. *V. cardui*. E. C. To 8000 ft.

64. *Melitæa aurinia*, var. *merope*. E. 6—7000 ft. July. —Only taken above Vernet at Pla Guilhelm; it agrees with the alpine form.
65. *M. phœbe*. E. C. To 5000 ft. — Commoner at Vernet than in the Hautes Pyrenées, whence Oberthür does not record it. I found one or two at St. Sauveur.
66. *M. didyma*. E. C. To 5000 ft. June, July.— Very variable here, as elsewhere. I do not think the very numerous varieties named in Staudinger's Catalogue can be strictly defined. Typical specimens are generally quite distinguishable, but in a very large series they run into each other.
67. *M. dejone*. E. To 3000 ft. June, July.—Commonest at St. Martin, near Vernet; not recorded in the Hautes Pyrenées.
68. *M. athalia*. E. C. To 5000 ft. June, July.— Very numerous and variable almost everywhere.
69. *M. parthenie*. E. C. 5000 ft. July.—I only found this near the Col du Cheval Mort, above Vernet. The form seems to come nearest *varia*, Meyer Dur, of the Alps. Oberthür notes it in the Hautes Pyrenées.
70. *M. dictynna*. E. C. 2—3000 ft. June, July.— Rare at Vernet; commoner near St. Sauveur.
71. *Argynnis euphrosyne*. E. C. 3—6000 ft. June, July.—Those found in the rhododendron region at 6000 ft. in July seem to be a transition to the Lapland form *fingal*, as are also some from the higher valleys of the Alps.
72. *A. selene*. E. C. 2—4000 ft.—I found it uncommon, but it was probably over in July.
73. *A. pales*. E. C. 5—8000 ft. July. — Common wherever I went above 5000 or 6000 ft., but I saw none of the dark females (*napæa*, Hüb.), which are so plentiful in some parts of the Alps.
74. *A. dia*. E. C. 2—3000 ft. June, July.
75. *A. daphne*. E. C. — Only taken at Vernet by M. Réné Oberthür, and seems rare farther west, where I did not take it myself.
76. *A. ino*. C. 4—5000 ft. July.—Not common in the Central Pyrenees. I took it in the Val du Lys only.
77. *A. lathonia*. E. C. To 5000 ft.

78. *A. aglaia.* E. C. 2—6000 ft. June, July.
79. *A. adippe.* E. C. To 5000 ft. July.
80. *A. paphia.* E. C. 2—4000 ft. July.
81. *Melanargia galathea.* C. To 3000 ft. July.
82. *M. lachesis.* E. 1—4000 ft. July.—Very abundant at Vernet, but I never saw *M. galathea* here or *lachesis* to the westward.
83. *Erebia epiphron.* E. C. 4—7000 ft. July. — The form which has been named *pyrenaica* by Herrich-Schäffer, and which is characterised by Staudinger as var. *major* ocellis magnis, seems to me too inconstant to be worthy of distinction, and, though the majority of the specimens I took at Vernet and in the Hautes Pyrenées, are certainly somewhat different, yet there occurred with them specimens hardly distinguishable from those of the Alps, which are usually *cassiope*. Staudinger notes *E. melampus* as found in the Pyrenees, but I know of no good authority for this.
84. *E. manto?*, var. *cæcilia*, Hb. C. 4500—6000 ft. July, August.—I found, in the Luchon district, a black spotless *Erebia*, associated with *æme*, which I at the time took to be a form of that species, but I find that it is referred by Staudinger and Oberthür to *manto*, which is also given by Staudinger, in his Catalogue, as an inhabitant of the Pyrenees. I never saw a specimen of *manto*, however, from these mountains, and, being also ignorant of the female of *cæcilia*, do not know if it differs as much on the under side from the male as the female of *manto* does from the male. *Cæcilia* is said to be found as an aberration in the Eastern Alps, and I have specimens from the Valais and Gadmenthal which are intermediate between *cæcilia* and *æme*.
85. *E. æme.* C. 4—6000 ft. July. — Not uncommon near Luchon in July. Struve mentions having found the var. *spodia* also in this district, but I think it is donbtfully distinguishable.
86. *E. stygne.* E. C. 3—6000 ft. June, July.—The commonest species of *Erebia* everywhere up to about 5000 ft., where it becomes mixed with *Evias* at Vernet, and some of the specimens taken here are so like *Evias* that I can hardly say to which they belong.

87. *E. Evias.* E. C. 5—7000 ft. June, July.—I found this only near Vernet at highish elevations, but de Graslin says it occurs also low down, as it does in the Valais, where I have taken it at 3000 ft. in May. My specimens are perhaps smaller, but I do not think can be separated from the Swiss *Evias*, though Staudinger, in his collection, has separated a form as var. *pyrenaica*.

88. *E. melas* forma *pyrenæa*, Ob. E. 7—9000 ft. July. *Cf.* Oberthür, Et. Ent., viii., pp. 20—24.—*E. melas* forma *Lefebvrei*, Boisd. C. 7—9000 ft. July. — Oberthür has written so much on the varieties of this species that I need say no more, but, if the true *Lefebvrei* of the Hautes Pyrenées was not connected by intermediate forms with that of Mt. Canigou, as Oberthür states it is, it would be better worthy of specific rank on account of the differences in both sexes than many species of *Erebia* which are looked on as distinct. It is curious that this species, which is found nowhere in the Alps west of Carniola, should reappear in great abundance in the Pyrenees, and that the form of the Eastern Pyrenees, as well as that found in the Picos d'Europa in Northern Spain, should both be much nearer to that of South-eastern Europe than the Central Pyrenean form. I found it abundant in certain places where the mountain slopes are covered with great stones and boulders. It is difficult to catch, unless a grassy spot can be found among or near these great stone-heaps, where running is impossible; but I took thirty males and two females in about two hours in one place above Vernet, and could have caught nearly as many on the Pic du Midi, if I had had time.

89. *E. lappona.* E. C. 6—9000 ft. July. — Common on the road to Pla Guilhelm, above Vernet, where the specimens do not differ from those found in the Alps; but the form taken in the Hautes Pyrenées, which has been named *sthennyo* by de Graslin, differs in the absence of the brown band on the fore wings, in which the black spots are enclosed; and those which I took on the Pic du Midi and near Gavarnie also differ in the

almost total absence of the broad fascia on the hind wings below.

90. *E. Tyndarus*, var. *dromus*. E. C. 5—8000 ft. July.—Common in most parts of the mountains, and separable from the Swiss form, as far as I can judge, those found near Vernet having a more distinct fulvous band than those from the Hautes Pyrenées. *Cf.* Ob., Et. Ent., viii., p. 25.

91. *E. Gorge* and var. *Gorgone*, Boisd. E. C. 6—9000 ft. July, August.—I am unable at present to say whether the form which is known as *Gorgone*, and which Staudinger characterises as follows: "var. *major*, ♂ subtus unicolor, ♀ venis albicantibus," is constantly distinct from *Gorge* or not. Struve says, Stett. Ent. Zeit., p. 403, that he found the two together at the Port de Venasque, above Luchon. He also includes both in his list of the Lepidoptera of the Eastern Pyrenees, whilst Oberthür says that in the Hautes Pyrenées *Gorgone* replaces *Gorge*. I found two varieties, one larger near the Port d'Espagne, and one smaller on the Pic du Midi, both in the Hautes Pyrenées, and came to the conclusion that they were both *Gorge*, like the form from Mt. Canigou; whilst others, of which the female is paler below than any alpine *Gorge*, and agree with Staudinger's definition of *Gorgone*, are not quite the same as those from Cauterets, given me as *Gorgone* by Oberthür. This author also describes and figures *Gorgone*, var. *gigantea*, from Northern Spain; so I think it seems clear that the various forms are not constant, though I have certainly seen none from the Alps which resemble the typical *Gorgone*.

92. *E. ncoridas*. E. 3000 ft. July, August.—This species had not appeared when I left Vernet, but Oberthür says it is common at the Monastery of St. Martin du Canigou, near Vernet, in August.

93. *E. pitho*, var. *pyrenaica*. C. August.—I did not take this species, which seems not uncommon at the end of the season in the Hautes Pyrenées; but my only specimen from the Pyrenees does not confirm Staudinger's distinction, which is as follows: "Minor magis ocellata subtus magis variegata."

94. *E. Euryale.* E. C. 5—6000 ft. July.—I did not find it common, and Oberthür says it is variable, as it is elsewhere.

It will be seen from the above remarks that there is still something to be done before the twelve species of *Erebia* found in the Pyrenees are thoroughly understood. Unfortunately there are no resident collectors who can accumulate long series, and see whether the supposed variations are constant; but MM. Oberthür have done much to clear up their obscurity, and we may hope for another part of the 'Études Entomologiques' to be devoted before long to the Pyrenees.

95. *Satyrus alcyone.* E. C. To 5000 ft. July.—The commonest of the genus at Vernet; rarer in the Hautes Pyrenées, where I found it as high as 5000 ft. at Gavarnie.

96. *S. circe.* E. 2000 ft. July.—Not common at Vernet, where it settles on tree-trunks and not on the ground, as most of the European *Satyrus* which I have seen habitually do. This species belongs to the group which is so well represented in the Himalaya, and which has been separated by Butler as *Aulocera*, though I do not as yet know whether there is any good generic distinction.

97. *S. Briseis.* E. To 4000 ft. (*fide* Struve).—I did not take this myself, but procured it at Vernet, and Struve notes it as found at Mont Louis.

98. *S. semele.* E. C. ? To 3000 ft. July.—I did not take this except near Vernet, but it doubtless occurs to the westward.

99. *S. arethusa*, var. *erythia*, and transitus ad *Boabdil.* E.—I insert this on the authority of M. Charles Oberthür. I doubt whether the forms distinguished as *erythia*, Hüb., *dentata*, Stgr., and *Boabdil*, Ramb., are constantly distinguishable.

100. *S. statilinus.* E. July.—Not taken by myself, but occurs not uncommonly below Vernet.

101. *S. fidia.* E. July.—On the dry hot hills between Vernet and Prades.

102. *S. actæa.* E.—Taken by M. Oberthür near Vernet.

103. *Parage mæra.* E. C. Up to 6000 or 7000 ft.

June, July.—A very common and variable species almost everywhere.

104. *P. ægeria*, var. *egerides*. C. 2000 ft.—Taken at Luchon and Biarritz.

105. *P. megæra*. E.—Not common at the season when I was in the Pyrenees, but occurred at Vernet.

106. *Epinephele lycaon*. E. 2—3000 ft. July.

107. *E. janira*, and var. *hispulla*. E. C. 2—5000 ft. July.—It seems difficult to separate the southern form *hispulla* in this part of France, where the females especially vary very much.

108. *E. ida*. E. 1—2000 ft.—Occurs on the hot dry hills below Vernet.

109. *E. pasiphae*. E. 1—2000 ft. July.—In the same places as the last, but frequenting brambles and thick bushy places near water.

110. *E. tithonus*. E. C. 2—3000 ft. July, August.—I did not take this at Vernet, though it occurs there. It was found at St. Sauveur, and very numerous at Biarritz.

111. *E. hyperanthus*. C. 2—3000 ft. — Common at Luchon, but not seen at Vernet.

Cœnonympha œdipus.—I do not know whether I ought to include this in the Pyrenean list, as I only found it near Biarritz, where it was found in marshy places, and probably extends into the western valleys of the hills.

112. *C. arcania*. E. C. To 5000 ft. June, July.—Common and variable. The specimens found at higher elevations were smaller than below, but I saw nothing like the alpine var. or species *satyrion*.

113. *C. dorus*. E. 1—2000 ft. July. — Common on the dry stony hills below Vernet.

114. *C. pamphilus*. E. C. To 5000 ft. June, July.

115. *C. iphis*. E.—I did not see this myself, but both Struve and de Graslin include it in their Vernet lists.

116. *Spilothyrus althœæ*. E. 3000 ft. July. — Rare at Vernet.

117. *S. lavatheræ*. C. 4500 ft.—Of this species I only saw one specimen in the box of a French gentleman who took it at Gavarnie.

118. *Syrichthus carthami*. E. C. To 5000 ft. July.

119. *S. alveus.* E. — De Graslin mentions also the varieties *fritillum* and *cirsii* as taken with the type in the Val d'Eyna, but I do not pretend to be able to distinguish them.
120. *S. serratulæ.* E.—Also mentioned by de Graslin as taken with the last.
121. *S. sao.* E. C. To 5000 ft. July.
122. *Nisoniades tages.* W.—Only taken by me at Biarritz, but doubtless occurs in the Western and Central Pyrenees.
123. *Hesperia thamnas.* E.
124. *H. lineola.* E. C.
125. *H. linea.* E.

No doubt these occur in the Central and Western Pyrenees, though I did not take them.

126. *H. comma.* E.— Only mentioned by de Graslin. I did not see it.
127. *H. sylvanus.* E. C. To 5000 ft. July.

Cyclopides morpheus. W. July. — Perhaps not rightly included, as I only took it near Biarritz. The flight of this species is unlike that of any other lepidopterous insect I ever saw. I found the males hovering with a short jerking flight over dried-up marsh and the females settled on hedges on the adjacent hill-side. It is curious that this peculiar insect, which has no congener in the Palæarctic region (unless *C. ornatus*, Brem., which seems to me to be generically distinct, is included), and which is local and only found here and there in Europe, should extend right through Armenia and Siberia to Amurland and Corea, without, as far as I know, the slightest variation.

If to the species in this list were added those which occur in the unexplored valleys on the Spanish side of the Pyrenees, and those which a better knowledge of the western and lower part of the range would no doubt include, we should probably have at least 150 species, or within twenty of the number found, according to Frey's latest work, in the whole of Switzerland, which is perhaps the richest part of Europe in Lepidoptera, considering its size.

Of species found in the Swiss Alps, but absent in the Pyrenees, the most worthy of notice are as follows :—

Parnassius delius.

Colias palæno.
Lycæna optilete, pheretes, donzelii, sebrus.
Limenitis populi, sibilla.
Neptis lucilla.
Melitæa maturna, aurelia, asteria.
Argynnis amathusia, thore.
Erebia melampus, mnestra, pharte, eeto, medusa, glacialis, medea, ligea.
Chionobas aello.
Pararge hiera.
Cœnonympha satyrion, davus.
Syrichthus andromedæ.

Many of these are high northern and alpine species, or frequenters of peat-bogs, which are rare in the Pyrenees.

Of the species found in the Pyrenees, but not in the Alps, some are inhabitants of the more arid region of Southern France, such as *Melanargia lachesis*, *Erebia neoridas*, *Cœnonympha dorus*, *Satyrus fidia*, and only found in the drier parts of the Eastern Pyrenees; whilst others, such as *Thecla roboris*, *Melitæa dejone*, are rather Spanish than French species. *Lycæna pyrenaica*, if really distinct from *orbitulus*, is the only one absolutely peculiar to the range, and *Erebia melas* is an inhabitant of South-eastern Europe; its variety *Lefebvrei*, however, seems to me to have quite as good a claim to be considered distinct as *L. pyrenaica*, and, were it not for the great variation which is found in the forms of *melas*, I should say that it was so.

In going through Staudinger's Catalogue, I find, among the Bombyces, the following species, which are supposed to be confined to the Pyrenees:—

Zygæna anthyllidis.
Emydia cribrum, var. *Rippertii*, which Struve thinks is a distinct species.
Hepialus pyrenaicus and *H. alticola.*
Psyche Leschenaultii.
Orygia aurolimbata, of which, however, a variety occurs in Spain.

Among the *Noctuæ* I do not find a single species recorded. Among the *Geometræ*, the following: *Cleogene peletieraria*, which differs only in the male sex from *C. nivcata* of the Alps; *Ortholitha calinaria*. *Eupithecia cynensata*, of which a single female only has been taken.

On the whole it is rather surprising that a range of mountains so extensive, so high, and so isolated as the Pyrenees should have developed so few distinct forms among the Lepidoptera, and should have so large a proportion of those inhabiting the Alps, which seem so completely separated from the Pyrenees by the great plains and low dry hills of Southern France. This is not the case among plants, of which there are, I think, a very much larger proportion of peculiar species in the Pyrenees; whilst a much greater number of common Swiss alpine plants are absent. I shall be glad to hear from entomologists whether this absence of peculiar species in the Pyrenees is also the case in other orders of insects, and how it is to be accounted for.

PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

FOR THE YEAR 1887.

February 2, 1887.

Dr. DAVID SHARP, M.B., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Nomination of Vice-Presidents.

The President nominated Mr. Robert M'Lachlan, F.R.S., Mr. Osbert Salvin, M.A., F.R.S., and Mr. H. T. Stainton, F.R.S., Vice-Presidents during the Session 1887–1888.

Election of Fellows.

The Rev. W. J. Holland, M.A., of Pittsburgh, United States; Dr. F. A. Dixey, M.A., Fellow of Wadham College, Oxford; Mr. C. J. Gahan, M.A., of Brompton, S.W.; and Mr. Sydney Klein, F.R.A.S., of Willesden, N.W.; were elected Fellows.

Exhibitions, &c.

Mr. P. Crowley exhibited a new species of *Synchlöe*—*S. Johnstoni*—from Kilimanjaro; also, for comparison, specimens of *Synchlöe mesentina* and *S. hellica*, which the new species closely resembled.

Mr. W. White exhibited a number of preserved larvæ of European Lepidoptera in various stages of growth, illustrating the gradual development of the markings and colours of the species. Amongst them were arranged nine examples each of *Saturnia carpini* and *Deilephila euphorbiæ*, the ontogeny of both which species, he remarked, had been most completely described by Prof. Weismann in his 'Studies in the Theory of Descent,' a work which had been rendered familiar to us in England by Prof. Meldola's admirably annotated translation. Mr. White called attention to a specimen of the local variety named *Ligurica*, of the former species, in which all trace of the black markings is lost; and also to a young individual of the latter species which possessed an anomalous annular excrescence between two of its segments. The younger stages of *Bombyx rubi* and *B. quercus* were amongst the other species exemplified by the specimens exhibited.

Mr. Gervase F. Mathew exhibited (1), a remarkable variety of the female of *Lycæna telicanus*, taken near Gallipoli, Turkey. The variation consisted in the usual white streaks on the under side of the hind wings of the species being replaced by white bands and blotches, and the fore wings having a large round white spot at the end of the cell; (2), some specimens of a species of *Lycæna* from Vigo, which he thought were varieties of *L. baton*, but which differed from that species in being much larger and darker. The wings of the males are more or less suffused with dusky towards the outer margins, instead of being a pale lilac-blue, and the fringes are not as evenly spotted as in *baton*; (3), examples of a *Leucophasia* from Vigo, which appeared to be identical with *L. astiva* of Staudinger.

Mr. G. T. Porritt exhibited, on behalf of Mr. N. F. Dobrée, a series of a remarkable red form of *Teniocampa gracilis*, bred last season from larvæ collected in Hampshire.

Mr. Eland Shaw exhibited specimens of *Pachytylus cinerascens* (Fab.), *Mecostethus grossus* (Linné), and *Gryllus flavipes* (Gmel.).

Papers read.

Mr. Eland Shaw read the following "Notes on the Identity of *Gryllus* (*Locusta*) *flavipes*, Gmel.":—

"Gmelin, in his edition (xiii.) of Syst. Nat. Linné, Tom i., part iv., p. 2088, No. 230, gives the name of *flavipes* to an insect in Leske's Museum, copying Zschach's description in Karsten's 'Museum Leskianum,' p. 49, No. 50. Donovan, in Nat. Hist. Brit. Insects (1806), xi., fig. 391, gives a good figure, calling it *Gryllus flavipes*, Gmel., but makes the mistake of attributing its appearance in the Syst. Nat. to Linné instead of Gmelin. This figure and the specimens which are labelled *flavipes*, Gmel., in the Brit. Mus. Brit. Coll. and the Dublin Nat. Mus., are to be referred to *Gryllus* (*Locusta*) *grossus*, Linné, Syst. Nat., ed. xii., p. 702, now placed in Fieber's genus *Mecostethus* of the *Acridiodea*. Donovan does not mention *grossus*, Linné, though both Zschach and Gmelin include it. Stephens, in Illustr. Brit. Ent. Mandib., vi. (1835), p. 21, gives a good description, and says that *flavipes* is not uncommon in marshes in this country, and supposes, from the silence of continental authors, that it is peculiar to Britain. Strange to say, he quotes Berkenhout, in Synopsis Nat. Hist. Gt. Brit. and Ireland, i. (1789), p. 112, No. 7, for *grossus*, Linné; but says 'Berkenhout gives this as British, but I presume improperly, as I have never seen an indigenous example.' It seems evident, however, that Berkenhout's description refers to one or more of our common species, probably of the genus *Stenobothrus*. The Brit. Mus. and Dublin specimens are, I believe, British, and Mr. M'Lachlan has one taken a few years ago in the fen district.

"Then comes the modern muddle in the synomymy. Leopold Fischer, in Orth. Europ. (1853), p. 395, gives *flavipes*, Gmel., of Donovan (*teste* Steph.), and *flavipes*, Steph., as synonymous with *Pachytylus cinerascens*, Fabr., but does not seem to have had Donovan's figure to refer to. Adam White, in compiling his list, Brit. Mus. Lists, xvii., 1855, copies Fischer's mistake, although, I believe, he must have had Donovan's figure and also specimens of *cinerascens*, Fabr., at his disposal; and he also gives *grossus*, Linné, as a doubtful British species. Brunner v. Wattenwyl, in his Prodr. der Europ. Orth. (1882), p. 173, also seems to have simply copied Fischer.

"So the synonymy ought to read:—

"*Gryllus* (*Locusta*) *grossus*, Linné (1766), Syst. Nat., i., 702 (nec. Berk. nec. Steph.); Fabr., Ent. Syst., ii., 61.

"*Acrydium grossum*, Latr., Hist. Nat. Crust. et Ins., xii., 155.

"*Œdipoda grossa*, Serv., Orth., 741.

"*Gomphocerus grossus*, Burm., Handb. der Ent., ii., 651.

"*Mecostethus grossus*, Fieber, Synopsis Lotos, iii., 99; Brunner v. Watt., Prod. der Eur. Orth., 94, fig. 24.

"*Stethophyma grossum*, Fischer, L., Orth. Eur., 357, pl. xvi., figs. 3–3*a*; White, A., Brit. Mus. List, xvii., 16.

"*Gryllus* (*Locusta*) *flavipes*, Gmelin, Syst. Nat. Linné, ed. xiii., Tom i., part iv., p. 2088, No. 230; Donovan, Nat. Hist. Brit. Ins., xii., 87, tab. 391.

"*Locusta flavipes*, Stephens, Illustr. Brit. Ent. Mandib., vi., 21.

"*Gryllus germanicus*, Stoll, Repres., tab. xxiii. *b*, fig. 89.

"*Acridium rubripes*, DeGeer, Mem., iii., 477, tab. xxii., fig. 4."

Mr. H. Goss read a communication from Prof. Riley, of Washington, on the subject of the "Australian Bug" (*Icerya purchasi*). It was stated that the insect had of late years become very destructive to various trees and shrubs in California, into which country, as well as into New Zealand and Cape Colony, it had been introduced from Australia, where it was believed to be indigenous; but on this point further evidence was asked for.

The Rev. T. A. Marshall communicated "A Monograph of the British *Braconidæ*." Part 2, being a continuation from Part 1 of the 'Transactions' for 1885.

Mr. Francis P. Pascoe read a paper entitled "Descriptions of some new species of *Brachycerus*."

Mr. Francis Galton, F.R.S., read a paper on "Pedigree Moth-breeding as a means of verifying Certain Important Constants in the General Theory of Heredity." In this paper Mr. Galton suggested the institution of a system of experimental breedings, to be continued for several years, with the object of procuring evidence as to the precise measure of the diminution of the rate at which a divergence from the average of the race proceeds in successive generations of continually selected animals.

Mr. Frederic Merrifield read a paper (by way of an appendix to Mr. Galton's paper) entitled "A proposed method of breeding *Selenia illustraria*, with the object of obtaining data for Mr. Galton."

Mons. Wailly suggested that *Bombyx cynthia* and certain species of *Attacus* would be suitable for breeding from for the purpose proposed.

Mr. M'Lachlan said he considered the fact that *S. illustraria* was dimorphic an objection to its selection for the experiments proposed, and he suggested that the Common Silkworm Moth, or some of the larger Bombyces referred to by Mons. Wailly, would be more suitable for Mr. Galton's purposes. He also said that the genus *Ephyra*, which had been named as suitable for breeding from for the purposes in question, was also open to objection on the ground of seasonal dimorphism; and he added that it was most important that the larvæ, if those of indigenous species be selected, should be kept in the open air, as the artificial conditions of life indoors would no doubt affect the result of the experiments.

Prof. Meldola stated that Mr. Galton had consulted him some weeks ago with respect to the proposed breeding experiments, and, although he had no practical experience in breeding *Selenia illustraria*, he was familiar with the life-histories of *S. illunaria* and *S. lunaria*. He wished, however, to call attention in the first place to some remarks on *S. illustraria* by Dr. Knaggs in the Ent. Mo, Mag. (vol. iii., pp. 238 and 256), which had some bearing on the projected experiments. Although *S. illustraria* was for some reasons a species well adapted for testing Mr. Galton's conclusions, he was inclined to believe that the fact of this moth being seasonally dimorphic was likely to introduce disturbing elements into the experiments which might or might not influence the results, but which would, at any rate, render any conclusions drawn from these experiments less satisfactory than if the species had not been seasonally dimorphic. The object of Mr. Galton's experiments, according to the paper which he had circulated, is to measure the diminution in the rate of divergence from the average racial character produced by continued selection in successive generations.

According to the known method of investigation the effects due to individual differences (sex, differences due to nourishment, &c.) could be eliminated, but it appeared to him (Prof. Meldola) somewhat doubtful whether the "probable error" could be properly estimated and allowed for in a species in which the alternate generations differed so considerably in size. In every individual of one generation there are present in a latent form the hereditary tendencies of the other generation, and the experiments of Weismann and Edwards have shown how slight are the influences which determine the production of one or the other form in a seasonally dimorphic species. In other words, the measurement of the rate of divergence would in such cases be complicated by the continued tendency of some of the individuals of one generation to approach those of the other in character; so that, although the extreme forms might be selected for pairing in one generation, it was at present doubtful whether the particular character selected (say size) would *necessarily* correspond in the two broods. There might be such a correspondence, but no experiments had hitherto been made in this direction, and the point therefore remained doubtful. Supposing, by way of example, that half a dozen of the largest pairs of the spring brood were selected and mated, and a similar number of the smallest pairs. The effects upon the size of their descendants could only be measured *in the next spring brood;* but in the meantime an autumn brood would have been interpolated, and the question as to whether this intermediate smaller brood influences the transmission of the selected character (large or small size), and if so, to what extent, and further, whether the superior or inferior size of the spring parents is associated with a corresponding superiority or inferiority in the size of their autumnal progeny, must be, as it appeared to him (Professor Meldola), in the first place settled by experiment before the "rate of divergence" required by Mr. Galton could be estimated in a manner that would place the results beyond the region of doubt. That periodic heredity does tend to produce instability of character is shown by the frequency with which intermediate forms have been bred in all

experiments upon seasonally dimorphic species, and every entomologist who has bred the spring and summer generations of *S. illunaria* knows that the two forms approach each other so closely in some individuals that unless actually labelled at the time it would be difficult to say to which generation they belonged. From these considerations it appeared to him that *S. illustraria*, although a species well worthy of being bred and studied, was perhaps not so well adapted for the proposed inquiry as some other species in which the phenomena of heredity were not so complicated. In attacking scientific problems where large numbers of facts had to be registered it was always desirable to eliminate, as far as possible, all disturbing influences, and to begin with the simplest attainable cases. Whether such a simplification of the results was possible in the case of a seasonally dimorphic species, it was for Mr. Galton to determine; but, since the only object in selecting *S. illustraria* was that, being double-brooded, it would be possible to get through two generations annually, he would suggest that some digoneutic non-seasonally dimorphic species should in the first place be experimented upon, and he would mention the very common *Rumia crataegata* as a very good moth for the purpose. In concluding Prof. Meldola said that he did not in any way wish to discourage the proposed experiments with *P. illustraria*. He thought that many points of the highest possible importance to the theory of heredity, some of which he had alluded to in his previous remarks, could be cleared up by the projected investigation; and he trusted that Mr. Merrifield would carry on the work, bearing those points in view. All he contended for was that for Mr. Galton's particular purpose this or any other seasonally dimorphic species was not likely to yield such satisfactory results as the species suggested by him.

Mr. W. F. Kirby pointed out a difficulty which might arise in making these experiments on account of the general diminution of size in specimens bred in confinement; and he cited *Liparis dispar* as an instance of the gradual diminution in size of a species when bred in confinement for several generations. He remarked that prior to the extinction of the

species in this country the British specimens were considerably larger than the continental type, whereas at the present day the specimens bred in confinement are much below the average size of the continental specimens.

Mr. Baly suggested that the development of the eggs might be retarded so as to counteract this tendency to diminution in size.

Mr. W. White asked whether *Abraxas grossulariata* had been thought of as suitable for the proposed experiments instead of *Selenia illustraria*.

Mr. Porritt observed that he thought some species of *Ephyra*—for instance, *orbicularia* or *omicronaria*—would be the best to breed from for Mr. Galton's purposes.

Mr. Sydney Klein suggested a possible difficulty in the measurement of the moths; and he dwelt on the great importance of keeping the larvæ out of doors.

Mr. Waterhouse thought the measurement of the wings would be difficult unless some definite plan of measurements to be followed with every specimen, were agreed upon.

Mr. Dunning expressed an opinion that the proposed experiments ought not to be left to any one individual, or be confined to any one species.

Mr. Bates said he had no practical experience in breeding British moths, but he suggested that an amended memorandum, explaining exactly the data required by Mr. Galton, should be printed and circulated amongst all the entomologists in the United Kingdom, whether members of the Society or not.

Dr. Sharp remarked that he thought valuable results would be obtained from a series of systematic observations such as those proposed by Mr. Galton and Mr. Merrifield; but that if more than one observer were required it would be necessary for the authors to publish a statement containing full details as to the selection of moths, the preservation of specimens, and the mode of measurement to be adopted.

March 2, 1887.

Dr. David Sharp, M.B., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Fellows.

The Rev. Thomas Wm. Daltry, M.A., F.L.S., of Madeley Vicarage, Staffordshire; Dr. Neville Manders, L.R.C.P., of the Army Medical Staff, Mooltan, Punjaub, India; Mr. Alfred Sich, of Chiswick; and Mr. James P. McDougall, of Blackheath, were elected Fellows.

Exhibitions, &c.

Mr. Slater exhibited, on behalf of Mr. J. P. Mutch,—in illustration of the effect of food in producing variation in Lepidoptera,—two specimens of *Arctia caja*, one of which had been bred from a larva fed on lime-leaves, and the other from a larva fed on the low plants constituting the ordinary pabulum of the species.

Mr. H. J. Elwes exhibited a large number of Lepidoptera-Heterocera selected from those caught by him, with the assistance of Mr. O. Möller, in the verandah of the Club at Darjeeling, in Sikkim, at an elevation of 7000 feet, on the night of Aug. 4th, 1886, between 9 p.m. and 1 a.m. They represented above 120 species, which is believed to be a larger number than had been ever previously caught in one night. Mr. Elwes stated that Mr. Wallace's observations on the conditions most favourable for collecting moths in the tropics were abundantly confirmed by his own experience during four months' collecting in Sikkim and the Khasias. These conditions are—a dark wet night in the rainy season; a situation commanding a large extent of virgin forest and uncultivated ground; and a white-washed verandah not too high, with powerful lamps in it. At the Darjeeling Club he lost many of the larger species which flew up to the top of the verandah, where they were often caught by bats when out of his reach. He said that on many nights during June and July he took from sixty to eighty species, and during his

stay there obtained from six to seven hundred species in this manner, though this is probably not a third of the species which were obtained by the late Mr. Atkinson, who resided a great part of several seasons at Darjeeling. Among the species exhibited were the following:—

Bombyces.—*Zeuzera multipunctata*, Moore; *Stauropus sikkimensis*, Moore; *Dasychira albescens*, Moore; *Lophopteryx saturata*, Walk.; *Chrysorabdia viridata*, Moore; *Oreta obtusa*, Walk.; *O. vinaria*, Moore; *Gazalina antica*, Walk.; *Agnidra speculuria*, Walk.; *Agrisius guttiritta*, Walk.; *Bizone divakara*, Moore; *Euproctes melanophila*, Walk.; *Barsine flammealis*, Moore; *Sendyra catocalina*, Walk.; *S. bala*, Moore; *Prabasa* sp., near *venosa*, Moore; *Tyana callichlora*, Walk.; and others unnamed.

Noctuæ. — *Diphthera prasinaria*; *D. atrovirens*; *Canna pulchripicta*; *Gaurena florens*, Walk.; *Graphiphora rubricilla*; *Gonitis involuta*; *Plusia verticillata*, Guen.; *Arvena selenamphora?*; and five other species.

Geometræ. — *Aspilates Falconaria*; *Nelcynda rectificata*; *Boarmia albidaria*; *Boarmia* sp.; *Odontoptera chalybeata*; *Urapteryx ebuleata*, Guen.; *Crocallis*, sp. nova?; *Sironopteryx rufivinctata*; *Cidaria aurigona*, Butl.; *Cidaria*, sp. nova?; *Acidalia vagata*; *A. plurilineuria*; *Myrtela planaria*; *Macrosilix mysticata*, Walk.; *Pseudocoremia quadrifida*; *Anisodes myriaria*; *Thalera glaucaria*; *Thalassodes distinctaria*; *Diopteris?*, sp. nova; *Eupithæcia*, sp. nova?; *Eupithæcia* sp.; *Eupithæcia* sp.; and six other Geometers.

Crambites and Micros. — *Pygospila tyres*, Cr.; *Euglyphis fulvidorsalis*; *Heterodes cinereulis*, Moore; *Margaronia conchylalis*; *Phakellura indica*; *Glyphodes* sp.; *Glyphodes* sp.; *Botys* sp., near *lupulinalis*; *Hypana lacessalis*; *Hypana* sp., near *crassalis*; and twenty other species, many of which are probably undescribed.

Mr. Elwes remarked that the difficulty of naming Indian Heterocera, excepting the larger species of Sphinges and Bombyces which have been mostly collected hitherto, is very great; and the extremely large number of genera described by Walker and Moore, which have never been properly defined

by their authors, or critically examined by other entomologists, makes the study of Indian moths, especially in the absence of any general catalogue of Heterocera, a most difficult and troublesome task. It is much to be hoped that a general revision of the Indian Heterocera will soon be undertaken by a competent naturalist. He also made some remarks on the Khasia Hills, which he believed to be the true habitat of the greater part of those insects described many years ago by Prof. Westwood and others as from Sylhet. A great part of this district is a flat cultivated plain, under water during the rainy season; and, though some of the species supposed to come from Sylhet occur no doubt on the elevated hillocks or "teelahs," which are the favourite sites for tea-gardens, yet the majority of them are taken by natives at low elevations, in such places as Terria Ghat and Lacait, on the southern slopes of the Khasia, and brought for sale to the town of Sylhet, which is not far off. Owing to the unhealthy and extremely hot and wet climate of these lower hills no Europeans have done much collecting there. Mr. Elwes further pointed out that almost all the hill-tracts of Assam are an extraordinarily rich and practically virgin field for the entomologist. He believed that any man of energy, good constitution, and temperate habits might spend several seasons most profitably and agreeably in collecting insects in Assam, where the means of communication and facilities for travel are now much greater than formerly, and where good travellers' bungalows are found in many places most convenient and suitable for collecting.

A discussion ensued, in which Mr. M'Lachlan, Dr. Sharp, Mr. Champion, Mr. Poulton, Mr. Kirby, and others took part.

The Rev. W. W. Fowler exhibited a specimen of *Cathormiocerus socius*, taken a few years ago at Sandown, Isle of Wight. It was captured near the shore, having evidently been washed down by heavy rains from some plants on the cliff.

Mr. S. Stevens exhibited a specimen of *Cathormiocerus maritimus*, and a specimen of *Platytarsus hirtus*, taken many years ago in moss.

Mr. F. Grut said he was requested by Mons. Péringuey, of

Cape Town, to announce that the latter was engaged on a monograph of the genus *Hipporrhinus*, and wanted British entomologists to send him specimens, and give him other assistance.

Papers read.

Mr. Gervase F. Mathew, R.N., communicated a paper entitled "Descriptions of new species of Rhopalocera from the Solomon Islands."

Mr. G. T. Baker communicated a paper entitled "Description of a new species of the lepidopterous genus *Carama*, together with a few notes on the genus"; and a second paper entitled "Description of a new species of Rhopalocera allied to *Thecla*."

April 6, 1887.

Dr. David Sharp, M.B., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Fellows.

Mr. Francis Galton, M.A., F.R.S., of 42, Rutland Gate, S.W.; Mr. John Henry Leech, B.A., F.L.S., F.Z.S., of 10, Hyde Park Terrace, W.; and Mr. George S. Parkinson, of Percy Cross, Fulham, W., were elected Fellows.

Exhibitions, &c.

Mr. Samuel Stevens exhibited specimens of *Arctia mendica* collected in the County of Cork, Ireland, by Mr. McDowall, of Manchester. The majority of the males were as white as the females of the English form, but some of them were of a smoky-white colour, intermediate between the white Irish specimens and the English form. The females were almost identical with the English type, but differed therefrom in having fewer spots on the wings. Mr. Stevens stated that Mr. McDowall had never met with the black or ordinary English form of the male in Cork.

Mr. M'Lachlan exhibited a zinc box, used by anglers for

the purpose of keeping living flies in, which he thought might be adapted to practical entomological use in the field.

Mr. George T. Porritt exhibited a long series of *Hybernia progemmaria*, bred from moths collected at Huddersfield last spring. He said that out of two hundred specimens all the females and a large proportion of the males belonged to the dark variety called *fuscata*, which, though almost unknown twenty years ago in the West Riding, now seemed likely to replace the paler and original type of the species.

Mr. Jenner Weir observed that the melanic varieties of *Hybernia progemmaria* were very interesting, as it appeared from Mr. Porritt's statement that twenty years ago this dark form was unknown. He suggested that the development of this form might be due to the greater number of manufactories in the district, and the consequent increase of smoke and the blackening of the tree-trunks on which the species is usually found, which would give the dark form an advantage over the paler form in the struggle for existence. This seemed the more probable because all the females, which were apterous, were darker than the males, and would be well concealed by their colour, which much resembled a piece of bark. Mr. Weir added that the same remarks would apply to the melanic variety of *Biston betularia*, which had also appeared of late years, and was also becoming more common.

Lord Walsingham also commented on the apparent increase in the number of melanic forms in the north, and suggested explanations of the probable causes of such increase.

Mr. Gervase Mathew, R.N., exhibited several new species of Rhopalocera taken by him in the Solomon Islands during the visits to those islands of H.M.S. 'Espiègle' in 1882 and 1883. Amongst the specimens exhibited were species of *Euploea*, *Mycalesis*, *Messarus*, *Rhinopolpa*, *Cyrestis*, *Diadema*, *Parthenos*, *Lampides*, *Sithon*, *Pieris*, *Papilio*, &c.

Mr. E. B. Poulton exhibited a large hairy Bombyciform larva brought from Celebes by Dr. Hickson. The natives describe the larva as causing a complaint of the nature of erysipelas in those who touch it. On handling the larva, which had been kept in spirit, the points of the short crowded bristles deeply penetrate the skin, while the bristles themselves

break off at their contracted bases. The sharp points being barbed adhere with great force, and further penetration would doubtless ensue if they were neglected. The bristles are hollow, and may convey an irritant poison, but no aperture has yet been found in the apex. There are longer hairs on the larva which appear to produce no effect.

Lord Walsingham called attention to the way in which the hairs were barbed in *Pityocampa processionea* and some other species.

Mr. M'Lachlan remarked that it was well known that urtication, in the case of some species, was caused by the mere mechanical action of the hairs in the skin, but that other species possessed glands at the base of the hairs which contained an irritant poison.

Mr. Poulton said that formic acid had been detected in the hairs, as well as in the blood, of *P. processionea*, but that in many species—including *Liparis auriflua*—irritation was simply due to the presence of hairs which had penetrated the skin, and that he had experienced great irritation after tearing to pieces an old cocoon of that species.

Lord Walsingham, Mr. Jenner Weir, and Mr. Slater said that they had experienced greater irritation from handling the larvæ of *Liparis chrysorrhœa* than from the larvæ of *Liparis auriflua*.

Mr. Philip Crowley exhibited a collection of Lepidoptera recently received by him from the West Coast of Africa. Amongst the specimens exhibited were several new or undescribed species of *Mylothris*, *Diadema*, *Harma*, *Rhomalæosoma*, &c.

Mr. H. Goss called attention to the capture, at Oporto last September, by Mr. G. D. Tait, of a specimen of *Anosia plexippus*. He remarked that, although some twenty specimens had during the last few years been captured in the South of England, only two other specimens had been recorded from the continent of Europe.

Lord Walsingham exhibited about twenty new species belonging to *Acrolophus*, *Anaphora*, and other allied genera.

Papers read.

Lord Walsingham read a paper entitled "A Revision of the Genera *Acrolophus* (Poey) and *Anaphora* (Clem.)."

Mr. Stainton made some remarks on species of these genera, and said he was very glad to find Lord Walsingham was working at *Anaphora* and allied genera.

Mr. M'Lachlan said that the neuration of the wings and the genitalia and anal appendages were amongst the most constant and best characteristics of genera and species. He wished that lepidopterists generally would give more attention to structural characters, and not be guided so much by colour and wing-pattern; Lord Walsingham had worked at these genera in a very thorough manner, and the attention which he had bestowed on details was apparent from the descriptions of the species and the plates which accompanied the paper.

Dr. Sharp and Mr. Champion also made some remarks on the paper.

Mr. E. B. Poulton read "Notes in 1886 on Lepidopterous Larvæ, &c.":—

"1. *Markings and red spots of Smerinthus larvæ.*—The markings of a young *S. populi* (in the second stage) were described and compared with those of the mature larva, the comparison indicating the greatest uniformity and supporting Weismann's conclusions. A mature *S. ocellatus* was described, possessing a very complete system of red spots, and in similar varieties of *S. populi* it was shown that the spots may be found in the second stage, and that they may diminish or may even disappear in the succeeding stage; although it is well known that in other individuals they may undergo gradual development. The order of the appearance of the spots upon the segments, *viz.*, first upon the 3rd abdominal and then upon the 2nd thoracic segment, was seen in *S. populi*, thus confirming Mr. White's observations. In *S. tiliæ* it was shown that the spots may arise from the shortening and broadening of linear borders to the stripes, so that in this species the spots are probably the remnants of coloured borders, as Mr. Poulton suggested last year.

"2. *An ancestral Sphinx larva from Celebes.*—This probably mature larva, brought by Dr. Hickson, was exhibited, and shown to possess a pair of terrifying eye-like marks and the correlated body-form of *Chærocampa*: the whitish oblique stripes with borders of darkened ground-colour, traces of subdorsal, and of shagreening, of *Smerinthus* and the younger stages of *Sphinx*; the curved caudal horn of the latter genus, which, however, was far more shagreened than the rest of the body, as in *Acherontia*. The ground-colour had been green.

"3. *The attitude of Geometer larvæ.*—It was shown that the spiral attitude upon leaves is assumed by the young larvæ of *R. crataegata* and *S. lunaria*; that the supporting thread is dispensed with in *A. betularia*, the larva merely holding a twig or leaf in the clasp of its thoracic legs; and that the line of contact between certain Geometer larvæ and the twig to which they are holding by the claspers is softened by the presence of a fringe of light-coloured lobes, thus preventing the deep shadow which would otherwise be conspicuous (strongly confirming this interpretation of the use of similar structures in other larvæ originally suggested by Prof. Meldola). The exact resemblance of the larva of *R. crataegata* to the special peculiarities of its chief food-plant—hawthorn—was pointed out, and it was suggested that such a close identity in appearance must have been the result of a great length of time—that the hawthorn is the ancestral food-plant.

"4. *Defensive structures of the larva of D. vinula.*—It was shown that the prothoracic gland secreting formic acid can be everted by pressure, and that it consists of four (not six, as Mr. Poulton stated last year) tubes and a central sac. The larva in ejecting the secretion seems to be entirely guided as to direction by the tactile sense. The flagella of the same species were described and figured, showing their retractor muscles together with a large ganglion which occupies the axis of the organ.

"5. *Additional eversible glands.* — Prothoracic glands were described in many larvæ, and they were shown to be bifid in *Pieris rapæ*, thus leading towards the more complicated organs of *Dicranura*. A dorsal gland upon each of the 6th and 7th abdominal segments was described as a character of the larvæ

of *Liparidæ*, except *Demas*, in which both are absent, and *Dasychira*, which only possesses the posterior gland. The ventral glands of *Crœsus* were figured, showing the retractor muscle.

"6. *Markings on larvæ before pupation.* — Markings were described upon the 2nd and 3rd thoracic segments, immediately over the pupal wings, which are being formed beneath. In *G. libatrix* the markings were shown by figures to be black and very distinct. Sections proved that the black pigment was in the superficial layer of the cuticle, which therefore is not beyond the reach of such physiological processes as are implied by its deposition at so late a period of larval life.

"7. *Notes on Paniscus cephalotes.* — It was shown that the pupal stage lasts for about a month; that the imagos may emerge at the time when the young *D. rinula* larvæ (which they often attack) are hatched. One imago was seen to attack a larva (of *T. gothica*) with its mandibles as though it were in want of animal food. The position of the eggs of this species on three larvæ of *D. rinula* was described, together with the experiments in which all the eggs but one were removed in the case of each larva; the remaining egg producing a larva which attained an enormous size. An error in the description of the egg made by Mr. Poulton (last year) was corrected.

"8. *A covering for the eyes of the imago of G. libatrix.*— A tuft of hair was described upon the basal part of the antennæ, which covers the eyes in the protective attitude of resemblance to a dead withered leaf. Thus the brilliancy of these organs does not render the insect conspicuous. It was also considered probable that the tuft of hairs may act as a defence.

"9. *The late emergence of female moths from the pupa.* — It was suggested that this very generally observed fact was of value to the species in securing competition among the males for the females as they emerge, instead of a success merely determined by emergence at an appropriate time.

"10. *Hereditary transmission of pink tubercles in the larva of S. carpini.* — Dr. Dixey obtained eighty larvæ in 1885, of

which three possessed the pink tubercles, instead of the normal golden colour; in 1886 larvæ were obtained from a pair of moths (male and female) which were developed from two of the larvæ with pink tubercles. Out of the eighty-eight larvæ thus obtained no less than sixty-four possessed pink tubercles.

"11. *Phytophagous larvæ and many species of food-plant.*— Many partially-grown larvæ were described as refusing well-known species of food-plant, which would have been readily eaten had the larvæ been hatched upon the plant; thus a special relation, which did not exist in the newly-hatched larva, may grow up between the latter and its food-plant within the limits of a single larval life. These facts were shown to partially remove the apparent difficulties in the way of an alteration in the food-plants of a species in its spread into new countries, &c.

"12. *Origin of carnivorous habits in phytophagous larvæ.*— It was shown that purely plant-eating larvæ (such as *D. vinula*, *S. ocellatus*, and *A. betularia*) become carnivorous when from any accident they are deprived of vegetable food, the well-known propensities (nibbling each other's horns) of the two species first-mentioned being largely dependent, in frequency and in degree, upon the quality and amount of the normal food. It was argued that confirmed carnivorous habits arose from the repetition of such a cause.

"13. *Young larvæ seeking light.* — It was shown that the young and dark larvæ of *S. carpini* and *V. urticæ* persistently seek the light, thus perhaps supporting the conclusions of Lord Walsingham as to the advantages gained by insects in the absorption of radiant energy.

"14. *The force of gravitation probably appreciated by larvæ.*— It was argued that larvæ which have from any cause fallen from their food-plant are probably guided in the upward direction by an appreciation of this force. It was found that *V. urticæ* larvæ, placed in a closely shut box immediately after removal from their food-plant, always climbed to the topmost part of the box, and correspondingly shifted their position when the box was turned upside down."

In the discussion which ensued, Lord Walsingham referred

at some length to instances of protective resemblance in larvæ; he disclaimed the discovery of prothoracic glands in certain larvæ, which Mr. Poulton had in his paper attributed to him, and said that attention had been called to the subject in a paper published in the 'Annales de la Société Entomologique de France.' He remarked that these glands occurred in larvæ of some species of the genus *Melitæa*, and that he had also noticed their existence in the larvæ of some of the sawflies. In conclusion, Lord Walsingham said he could not agree with Mr. Poulton's remarks that larvæ which had fallen from their food-plants were probably guided in an upward direction by an appreciation of the force of gravitation; he believed that larvæ in climbing up were merely instinctively endeavouring to regain their food-plants.

Mr. Jenner Weir cited further instances of protective resemblance, both amongst larvæ and perfect insects.

Dr. F. A. Dixey asked whether in the extended condition of the flagellum in *D. vinula* the blood was contained in any special receptacle, or simply found its way among the tissues generally. He remarked on the extraordinary powers of contraction which appeared to be possessed by the retractor muscle of this organ, and enquired whether any corresponding peculiarities of minute structure had been observed in it. The muscular tissue of insects generally was noticeable as exhibiting histological details in a well-marked manner, and it would be interesting to ascertain whether any special structural feature accompanied so remarkable a physiological development as this appeared to be. With regard to the larvæ of *Saturnia carpini*, there was no doubt that when kept in captivity they displayed in their early stages a strong tendency to flock together; though this might be due rather to their common desire to occupy a particular situation in their abode than to any real gregarious habit. When kept under glass cylinders they invariably sought the lightest side, and if the glass was moved they shifted their own position accordingly. Lord Walsingham's explanation of the tendency of certain larvæ to travel upwards, as being merely due to an instinctive desire to regain their food after being dislodged, gave no doubt the true meaning of the habit; but he

thought at the same time that Mr. Poulton had rightly attributed to them a sense of the force of gravity, as it would be difficult to see what other sense could guide them to whichever part happened to be uppermost of a closed box kept in the pocket. With regard to the dark spots observed by Mr. Poulton in the larvæ of *G. libatrix* immediately before pupation, he had seen a similar appearance in the case of a large parasitic hymenopterous larva.

Mr. Poulton, in reply to the first question, said that no special receptacle existed in the flagellum, but that the blood found its way in the lacunæ between the structures in the organ. In reply to the second, he said that observations on the minute structure of the muscle would no doubt be very interesting, but had not yet been made; and that the very same reasoning used by Dr. Dixey had occurred to him on first observing the extraordinary contraction of the retractor muscle. Mr. Poulton hoped to undertake the histological investigation, which certainly promised good results if unusual functional activity were attended by a correspondingly unusual minute structure.

He explained that the statement in the paper was that Lord Walsingham had first called his attention to the prothoracic glands of larvæ.

He wished to add to Dr. Dixey's arguments in favour of the appreciation of gravity by fallen larvæ as a guide in regaining their food-plant—the conclusion that larvæ cannot *see* in the true sense of the word. He thought that many experiments and observations seemed to render it probable that the ocelli are of no value as a guide to the movements of larvæ. He had covered the ocelli of numbers of larvæ with an opaque black varnish, which had been renewed at every change of skin, but no difference could be observed between the movements of these and the normal larvæ. He therefore argued that it was extremely improbable that the larvæ could regain the distant leaves of a tree from which they had fallen by the guidance of the sense of sight; and as a matter of fact such larvæ are often seen to ascend walls, palings, or other objects, which do not lead to any food, as if acting under a blind impulse to move upwards. Mr. Poulton argued that if

such an upward movement always occurs and is independent of sight, and in fact of the presence of light or of the food-plant itself (as was proved in the case of *V. urticæ*), it was difficult to imagine anything which could serve as a guide, except the appreciation of the force of gravitation.

In conclusion, Mr. Poulton expressed great interest in Dr. Dixey's description of the claret-coloured spots on a hymenopterous larva; and he thought it extremely probable that the character might possibly be found to be of great morphological interest as bearing upon the origin of wings in *Insecta*.

The discussion was further continued by Mr. Gervase Mathew, Mr. W. White, Mr. G. T. Porritt, Dr. Sharp, and others.

May 4, 1887.

Dr. David Sharp, M.B., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Fellows.

The Rev. C. Ellis-Stevens, B.D., of 236, Green Avenue, Brooklyn, New York, U.S.A.; Mr. Henry Rowland Brown, B.A., of Oxhey Grove, Stanmore, Middlesex; Mr. Frederic Merrifield, of 24, Vernon Terrace, Brighton; and Mr. Coryndon Matthews, of Erme Wood, Ivybridge, Devon, were elected Fellows.

Exhibitions, &c.

Mr. Wm. Warren exhibited *Euzophera oblitella*, Z., caught in the Isle of Wight; and, for purposes of comparison, a pair of *Stigmonota pallifrontana*, Z. (a species taken several years ago by Mr. W. Thompson, of Stoney Stratford), and a pair of *S. internana*, Gn., with which the former had been till lately confounded. He also exhibited specimens of *Asthenia pygmæana*, Hb., another species new to Britain, and *A. abiegana* (Dup.) (*subsequana*, Haw.).

Mr. Stainton remarked that the two last-named species (*Asthenia pygmæana* and *A. abiegana*) both had white underwings, and were in other respects very similar. It was formerly thought that Haworth's *subsequana* was identical with the species previously figured by Hübner as *pygmæana*; but now that the two allied species were critically examined it appeared that the species described by Haworth as *subsequana* was not Hübner's *pygmæana*, but another species known as the *abiegana* of Duponchel, dating only from 1842, so that Haworth's name *subsequana* had priority by thirty years.

Mr. F. Pascoe exhibited a living specimen of *Diazines Taylori* (Wath.), taken out of the stem of an orchid—*Saccolabium cæleste*—growing in an orchid-house at Croydon, and received from Moulmein, in Burmah.

Mr. Pascoe stated, with reference to his paper on *Brachycerus* in the April number of the Transactions, that M. Aurivillius had informed him, but with a mark of doubt, that *B. suturalis* is *B. Eckloni*, Gyll., and *B. præcursor* is *B. oblongus*, Fåhr.; and that *B. albicollis* is probably a variety of *B. lividicollis*, Fåhr. As the two names last mentioned depend on colour, Mr. Pascoe said it would perhaps be convenient to preserve the former one. *B. obtusus* is, according to M. Aurivillius, allied to, if not identical with, *B. globiferus*, Thunb., but, judging from a full description of *B. bullatus*, given by Gyllenhall, which was subsequently referred to Thunberg's species, the two are quite different. Mr. Pascoe further said that he should be much obliged to any persons who recognise any of his figures as belonging to described species, if they would kindly let him know.

Mr. M'Lachlan exhibited nearly 200 specimens of Neuroptera, in beautiful condition, collected by Mr. E. Meyrick in various parts of Australia and Tasmania, comprising about seventy species. There were between forty and fifty species of Trichoptera, including moth-like forms from Western Australia, allied to *Plectrotarsus*, Kol.; and other species belonging to a group represented by *Hydropsyche Edwardsii* (M'Lach.). Among the Planipennia the most remarkable insect was a new species of the singular genus *Psychopsis*

(Newm.), from Mount Kosciusko, where it was common. Of Pseudo-Neuroptera there was a species of *Embiidæ* from Western Australia, and certain curious *Psocidæ* and *Perlidæ*. The Trichoptera appeared to be exclusively confined to *Sericostomatidæ*, *Leptoceridæ*, and *Hydropsychidæ*. Mr. Meyrick made some remarks on the localities in which he had collected the species.

Mr. M. Jacoby exhibited three specimens of a new species of *Xenarthra*, collected by Mr. G. Lewis in Ceylon; also a species of *Loxoprosopus* from Brazil.

Mr. C. O. Waterhouse exhibited a drawing of a flea which he believed to be a new species. Numbers of specimens were found on a small animal (*Myrmecobius*) from West Australia. He proposed naming it *Sarcopsylla myrmecobii*.

Mr. Waterhouse also exhibited a living example of an Ichneumon—*Ophion macrurum*—bred from a larva of *Callosamia promethea*, a North-American species of *Saturnidæ*. He further exhibited a number of wings of Lepidoptera denuded of the scales, in order to show the neuration for study, and explained the method he had adopted for removing the scales. The wings were first dipped in spirit and then placed in *eau de javelle* (potassium hyperchlorite). Mr. Waterhouse said he had sometimes substituted peroxide of hydrogen for *eau de javelle*, but the action was much less rapid, although the results were satisfactory.

Mr. Poulton observed that, although the pigment had disappeared, he thought the scales were not removed, but were merely rendered transparent; and he remarked that the discovery of some chemical for softening chitine had long been wanted to prepare specimens for the microscope. The discussion was continued by Mr. M'Lachlan and Dr. Sharp.

Mr. Slater read a note, extracted from the 'Medical Press,' on the subject of the poison used by certain tribes of African Bushmen in the preparation of their arrows. It was stated that a poison was prepared by them from the entrails of a caterpillar which they called "N'gwa."

The Rev. W. W. Fowler read the following extract from a a letter received from Mr. J. Gardner, of West Hartlepool:—

"Is it generally known by Coleopterists that *Dytiscus marginalis* possesses the power of making a loud buzzing noise, like a humble bee, when pressed against anything? I got a fine male a few days ago, which the tide had just washed ashore on the sand, and brought it home. As it was in a pill-box, much too small for its comfort, I turned it out into a glazed flower-pot until boiling water was got ready in which to kill it. It had not been there long, when, to my surprise, I heard a loud buzzing noise, and upon looking into the jar found *Dytiscus* standing close to the edge of the jar, apparently still, but making the loud buzzing noise just mentioned. I called my wife to observe the strange phenomenon of a water-beetle humming like a bee, when it suddenly took flight and flew out upon the table-cloth. I put it back, and it immediately commenced making the same noise, and then attempted another flight."

Dr. Sharp said he was familiar with the humming of *Dytiscus marginalis* previous to flight, and thought it might perhaps be connected with an inflation of the body for the purpose of diminishing the specific gravity of the insect; he had noticed also that it was occasionally accompanied by the discharge of fluid from the body.

Papers read.

Mr. William White read a paper "On the Occurrence of Anomalous Spots on Lepidopterous Larvæ." The paper dealt chiefly with the curious red spots which sometimes occur upon the larvæ of the genera *Smerinthus* and *Papilio*, and in it the author traced the order of development of the spots upon the several segments of the caterpillars, and considered their cause and purpose. The main peculiarity of their occurrence is that they do not resemble any other larval markings, and are dissimilar in regard to their incidence and other characters. They are found, upon minute examination, to vary considerably both in size and intensity, and they appear very irregularly amongst the individuals of a brood. In some cases only a single spot upon each side of one segment occurs—in one example there is a spot upon one side only; in others there is a series of spots forming a

complete row upon all or nearly all the segments; frequently a double row occurs upon each side of the caterpillar. Generally the proportion of individuals in a brood bearing the character is small; Prof. Weissmann observed a brood of ninety throughout its ontogeny, in which there was but one spotted. Notwithstanding these points of irregularity, there is apparently a regular course of development in relation to the segments that is distinctly traceable. This is shown in a series of analytical tables, in which the value of the spots is reduced to numerical equivalents. Upon twenty-two specimens of such larvæ (preserved) being submitted to close analysis, the order of development upon the segments is ascertained to be as follows:—

Dorsal row . . .	3, 7, 4, II., 5, 1, 6, 2, III., I., 8.
Spiracular row . .	4, 3, 5, II., 7, 6, 2, 8, 1, III., I.

The dorsal row is the more important series, and in the above summary it is thus shown that the development originates upon the 3rd abdominal segment. This point is well borne out by instances in which it is the only segment that bears the spots, and the experience of Dr. Weissmann is in exact agreement with this evidence. The next segment upon which it appears is the 7th abdominal, the 4th being in almost equal relation to that segment; then follows the 2nd thoracic segment (the three thoracic segments are distinguished by roman numerals); then the 5th abdominal, &c., as tabulated.

Another peculiarity shown in the tables is that there is a tendency towards a higher development on the left side than on the right. There are individuals which reverse this character slightly, but the tendency in the aggregate is in favour of the left side. It is not easy to imagine any cause for this inequality.

Mr. White said he took exception to Weissmann's theory that the spots form the nucleus of the coloured border to the white stripes of the allied *Sphinx ligustri*, which he considers is not supported even by his own evidence; for, as he himself states, the spots upon *Smerinthus*, when they occur, never develop beyond the spot state, while the stripes of *Sphinx* appear

suddenly on the 3rd or 4th stage, without passing through a spot stage. Mr. Poulton's view is that they indicate the decline of an old character, but this Mr. White also thought unsatisfactory, for the reason that if they were vestigial they would certainly recur in the younger phyletic stages, rather than after the later ecdyses. The testimony of Dr. Weissmann is that in his observations he invariably found them appear first in the later stages, and then increase in intensity. This would appear to be attested by the series of examples exhibited here.

The red spots which occur sometimes, but with greater rarity, upon larvæ of *Papilio podalirius* are similar in general character to those of *Smerinthus populi* and *ocellatus*, but they are unlike them in their distribution; in one of the specimens exhibited they are in pairs upon nearly all the abdominal segments, forming two longitudinal dorsal rows; but in another example they exist upon the anterior segments only, where in each case they are clustered more numerously in less regular arrangement. In this species they are also more sharply defined and circular, although there is an irregular red blotch upon the dorsal area of the 3rd thoracic and 1st abdominal segments, in addition to the spots.

After entering into the open question of the connection between the *Smerinthus* spots and leaf-galls, and the objective use of such relations, Mr. White said he considered that, in spite of the plausibility of the resemblance they bear to the nidus of some species of gall-insects which affect the proper leaves to these red spots, and although some other facts seem to favour that theory, there is no evidence whatever forthcoming to show how the process of simulation could be effected. Moreover, when the species of gall are considered in detail, in relation to time, it appears still more improbable that there is any connection existing between the spots and insect-galls.

In conclusion, Mr. White said he agreed with Prof. Weissmann in his view that the red spots upon these caterpillars form a new character in process of development,—within these restricted limits,—but whether such conspicuous spots upon species so admirably protected will prove beneficial or

injurious remains to be evidenced by prolonged series of field observations extended over a lengthy period, and only time will solve the problem.

Mr. Poulton stated that he had last year noticed the marking appear in one specimen of a brood of *Smerinthus* he had, first as a linear mark, then become a spot, and afterwards disappear; and he laid stress upon this as evidence of his theory, which Mr. White had not set forth clearly.

Mr. White, in replying, said he thought this case was so very extraordinary, and differed so entirely from all previous experience, that it required continued experiments to be carried on to complete the observation.

Mr. Waterhouse read "Descriptions of New Genera and Species of *Buprestidæ*."

June 1, 1887.

Dr. David Sharp, M.B., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Exhibitions, &c.

Mr. Philip Crowley exhibited the following specimens of Diurni, from the Kareen Hills, Burmah:—*Papilio Zaleucus*, Hew., *Papilio Adamsoni*, Smith, *Papilio* ? sp. (male and female), and *Nymphalis Nicholii*, Smith.

Mr. T. R. Billups exhibited specimens of an exotic ant, *Tapinoma melanocephalus*, For., taken by himself in September last at the Palm House, Kew, on a species of palm (*Howea Griesbachia*) from Tropical Australia: he remarked that the species was first described by Forel from Cayenne, then from the Tonga Islands, and lately from Bahia and St. Thomas; Forel also found it on board one of the West Indian Mail steamers; and it has also been met with in India and South America, but has not hitherto been found in Europe. This brings the number of exotic ants found in Kew Gardens by Messrs. Smith, Saunders, and Billups, up to seven.

Mr. Billups also exhibited living specimens of *Carabus auratus*, which had been found in vegetables in the Borough Market; and also of a species of *Blaps*, which had occurred in vegetables from Northern Africa.

Mr. Waterhouse exhibited a specimen of a Brazilian Locust, *Conocephalus* ? sp., which he had for some time preserved alive, and which had only died that same morning. He called attention to the change of colour which he had observed in the eyes of this insect; in a bright light they were dirty white or horn-coloured, with a black dot in the middle; but at night, or if the insects were confined in a dark box, they became altogether black; shortly after death, also, the eyes became black. Mr. M'Lachlan observed that he had noticed a darker spot in the centre of the eye in certain Ephemeridæ, and in other Neuroptera. The discussion was continued by Dr. Sharp and others, but no one seemed to be able to account for the alteration in question.

Lord Walsingham exhibited specimens of *Cateremna terebrella*, Zk., a species lately taken in Britain, which he had caught in Norfolk, and also bred from fir-cones gathered in the same locality.

Papers read.

Mr. Meyrick read two papers, (1) "On Pyralidina from Australia and the South Pacific," and (2) "Descriptions of some exotic Micro-Lepidoptera." In these papers about sixty new species were described. A discussion ensued, in which Dr. Sharp, Mr. Stainton, Mr. M'Lachlan, and others took part. Mr. Meyrick stated that, as far as the Pyralidina were concerned, Australia could not be regarded as a separate region, for a large number were not endemic, but appeared to have been introduced from the Malay Archipelago. The method of this immigration seemed doubtful. Mr. Meyrick was of opinion that the insects flew very long distances, and effected a settlement through their food-plants being widely distributed and common. He instanced the undoubted immigration of certain Australian species into New Zealand, a distance of 1200 miles. Mr. Stainton adduced the instance of *Margarodes unionalis*, which is a South-European insect, feeding on the olive, yet is occasionally found in Britain. In connection

with these papers Mr. Meyrick exhibited specimens of *Oxychirota paradoxa*, Meyr. (unique specimens representing the family Oxychirotidæ), *Epharpastis dædala*, Meyr., and *Mixophyla erminea*, Moore, and noticed two points bearing on geographical distribution as follows:—

"In connection with this and my previous papers on Australian *Pyralidina*, two points bearing on the question of geographical distribution suggest themselves.

"(1). Many Pyrales—principally *Botydidæ*—have a phenomenally wide geographical range. It is a common thing for the same species to occur unchanged in South Africa, Mauritius, Ceylon, South Asia, the Malay Archipelago, Australia, and through the South Pacific Islands to Tahiti; sometimes even extending into Central America. These insects are usually of inconsiderable size and weak flight; they do not appear in great numbers, or show any special migratory instincts. Yet immigration into Australia has taken place on so large a scale that, out of 129 species of *Botydidæ* established as occurring in Australia, 73 are found to be more or less widely distributed outside the Australian region. Most of these species are so far dependent on climate that they do not range far outside the tropical line; but, apart from this, they seem to have little regard for barriers, and little preference for one country as against another. It must be a necessary condition of such wide distribution that the larvæ should either feed on plants of extraordinarily wide range or be able to accommodate themselves to a variety of food. Evidence as to this is as yet scanty, but certainly a few do feed on common introduced weeds. I do not say that these facts prove anything, but they seem to suggest that, given a certain suitable climatic adaptability and a proper provision in the way of food, sea-barriers, unless very wide or very stormy, present no effectual obstacle to an insect endowed even with the feeblest powers of flight.

"(2). The distribution of this and other groups of Lepidoptera within Australia does not seem in any way to support the theory advanced by Dr. Wallace as to the origination of the peculiar Australian fauna within West Australia when separated as a distinct continent from East Australia. The

theory is based on the supposition that Australia presents at this time the phenomenon of an eastern and western fauna, each wholly distinct from the other. This by no means expresses the facts as I find them. The region is rich in Lepidoptera, but they occur principally in certain limited patches or tracts, either towards the sea-coast, or, if inland, on hill-ranges, because there alone the average rainfall is sufficient to maintain constantly the vegetation on which they exist. All such tracts are therefore in a sense more or less isolated, and may often contain numerous peculiar species. It would therefore be more just to regard the region as inhabited by a large number of separate faunæ, each differing more or less widely from its neighbours. Thus, in travelling from Sydney to Perth by the south coast, one would pass through about ten different faunæ; but the difference between the first and sixth would not be greater than that between the fifth and tenth. In other words, the rate of change is uniform on the whole, though irregular in detail. One of these faunæ occupies the south-west corner of Australia, within a line from Albany to Perth, roughly speaking; it has a good rainfall and very rich flora; and it is this corner which is usually intended when Western Australia is spoken of as the only part visited. One has, however, but to cross the low range whose foot lies ten miles inland from Perth, and the change of fauna begins at once, there being a distinctly perceptible increase in eastern forms. I may add incidentally that the indigenous Lepidopterous fauna of Western Australia, as a whole, consists mainly of Tineina, the other groups being poorly represented in endemic species as compared with Eastern Australia; the Geometrina stand next, but at a great distance."

Mr. Pascoe read a paper "On the genus *Byrsops*," a genus of Curculionidæ.

The President announced that Lord Walsingham's collection of Lepidoptera and their larvæ, recently presented to the Nation, would be exhibited in the Hall at the Natural History Museum, South Kensington, until the end of June.

July 6, 1887.

Dr. David Sharp, M.B., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of a Fellow.

The Rev. W. T. H. Newman, M.A., 11, Park Terrace, The Crescent, Oxford, was elected a Fellow of the Society.

Exhibitions, &c.

Mr. M'Lachlan remarked that at the meeting of the Society in October, 1886, he exhibited a quantity of the so-called "jumping seeds" from Mexico, containing larvæ of *Carpocapsa saltitans*, Westw. The seeds had long ceased to "jump," which proved that the larvæ were either dead, had become quiescent, or had pupated; about a fortnight ago he opened one of the seeds, and found therein a living pupa. On the 4th inst. a moth (exhibited) was produced.

The President, on behalf of the Rev. H. S. Gorham, exhibited the following Coleoptera, lately taken in the New Forest:—*Anoplodera sexguttata*, Fab., wholly black variety; *Grammoptera analis*, Fab.; *Colydium elongatum*, Fab.; and a specimen of *Tachinus elongatus*, Gyll., with brownish-red elytra.

Mr. S. Stevens exhibited a specimen of *Orsodacna humeralis*, Latr. (*lineola*, Panz., var.), taken by himself at Norwood: he also exhibited a specimen of the same beetle taken by himself fifty years ago in Coombe Wood; during the interval he had never seen it alive.

Mr. G. T. Porritt exhibited, on behalf of Mr. N. F. Dobrée, of Beverley, a series of about thirty specimens of a *Tæniocampa* he had received from Hampshire, which had previously been referred to as a red form of *T. gracilis*. Mr. Dobrée was inclined to think they were not that species, but *T. stabilis*.

Mr. A. C. Horner exhibited the following species of Coleoptera from the neighbourhood of Tonbridge:—*Compsochilus palpalis*, Esp. (5); *Acrognathus mandibularis*, Gyll. (4); *Homalota atrata*, Mann., *H. vilis*, Ev., and *H. difficilis*, Bris.;

Calodera rubens, Ev.; and *Oxytelus fulvipes*, Ev. He also exhibited a *Rhizophagus* from Sherwood Forest, which appeared to belong to a new species; and several specimens of *Holopedina polypori*, Först., also from Sherwood Forest, where he had found it in company with, and probably parasitic on, *Cis vestitus*. Concerning the latter insect he read the following notes from the Rev. T. A. Marshall:—

"Nunton Vicarage, Salisbury, Jan. 28, 1887. Dear Sir,—Your insects are undoubtedly *Holopedina polypori*, Först., fully described in Verh. Pr. Rheinl. 1850, p. 502. The description is very complete, and the insects were found by Förster in a similar situation to yours; and he also conjectured them to be parasites of *Cis*. I thank you very much for giving me specimens, as I had not seen the species before.

"I used to suppose that *H. polypori*, Först., was a synonym of *Cephalonomæa formiciformis*, West., having been informed upon some good authority (I forget whose) that this was so. It is quite clear to me now that the two species are distinct.

"*Holopedina* is very near *Bethylus*. I compared Panzer's figure of *Tiphia* (*Bethylus*) *cenoptera*, and at once concluded that your insect could not be that, from the antennæ and wings. The wings of *B. cenopterus* are infuscated, and have basal nervures, &c.—T. A. Marshall."

Mr. Elisha exhibited two larvæ of *Zelleria hepariella*, Stn.

Mr. Stainton remarked that as the greater part of the larvæ of *Zelleria* were attached to the *Oleaceæ*, it seemed strange that certain species had recently been found on Saxifrage.

Paper read.

Mr. Slater read the following paper,* "On the presence of Tannin in certain Insects, and its influence on their colours":—Whilst meditating on the colours of insects, I was struck with the fact that if we set aside the so-called metallic or iridescent colours, which are not due to any pigment, a vast majority of the remainder consist of what we may call "leather-colours," ranging from clay-colours, dull and impure yellows, to yellowish browns of very different degrees of intensity. On referring to descriptions

* Certain researches which I have just heard of compel me to lay my observations before the Society sooner than I expected.

and collections I found that these leather-colours are most decided in leaf-, wood-, and bark-eaters, such as Melolonthidæ, Dynastidæ, even Elateridæ, Buprestidæ, and Cetoniadæ, in the absence of metallic coloration. It therefore at once struck me that these colours may be due to the action of tannin and its derivatives upon nitrogenous animal matter. To test this supposition I took an elytron from each of several beetles, especially Melolonthidæ, steeped them for a short time in a mixture of alcohol and ether to remove anything greasy, and then placed them in a strong solution of ferric nitrate. The first specimen in the box is a *Melolontha macalis* which has thus been treated; the left elytron, which is a decided black, was fixed in its place again, to show the contrast with the original colour. This production of a black colour with solution of iron is a very good test for the presence of tannin. To confirm this result I treated other elytra with a solution of potassium dichromate and with copper acetate, and in each case I got the coloration which tannin is well known to produce. I then applied the solution of iron to the elytra of some carnivorous species, such as *Carabus monilis* and *Coccinella dispar*. The action, as it may be seen in the second and third specimens in the box, was practically *nil*. Hence it would seem that carnivorous groups of insects do not contain tannin in their tissues. I must now give a summary of the researches to which I alluded above, and which, though undertaken with a quite different purpose, certainly confirm my observations. M. Villon, writing to the Société des Sciences Industrielles de Lyon, states that he has for a long time sought for tannin formed in the tissues or in the secretions of an animal. He has found it in the well-known corn weevil, *Calandra granaria*. He mentions that so far back as 1810, Penant, of Bourges, found gallic acid, a body closely connected with tannin, in the same insect. M. Villon grinds up the weevils to a paste, extracts them with strong boiling alcohol, evaporates the liquid to dryness, and finally, after purifying the product, he obtains from 500 grammes of weevils 15 grammes of a tannin which he calls fracticornitannic acid. This substance possesses all the general properties of tannin, and has been experimentally used in tanning,

dyeing, &c. Indeed M. Villon's object seems to be to turn this animal tannin to practical account. The great part of the discovery is that it shows tannin to be common both to the animal and vegetable kingdoms, and thus breaks down one of the few remaining boundary-lines between these two main divisions of the organic world. The question still remains whether the tannin found in insects is elaborated by them *de novo* from their food, or is merely absorbed and assimilated without decomposition, just as we see it is the case with chlorophyll, and, I believe, with alizarine in the genus *Timarcha*. M. Villon seems to speak in favour of the former opinion, whilst my observations, so far as they have gone, would suggest the latter. Still it is perfectly possible that tannin might be generated in the organs of a Lamellicorn beetle, but not in those of a Carab. It has occurred to me that black patterns on buff or brown grounds may possibly be produced by iron held in solution in the blood of the insect being deposited in some parts of the chitinous tissue rather than in others. On prolonged steeping certain elytra in solutions of iron I have found black lines and spots making their appearance. The power of chitine to take up colouring-matters is considerable; the specimens given are dyed respectively with magenta, orchil extract, basic aniline blue, and soluble indigo. Chitine when pure does not, however, turn brown or black when steeped in the solutions of iron, thus showing that the presence of tannin is needed for the production of those colours."

A discussion ensued, in which Prof. Meldola, Mr. Poulton, Dr. Sharp, and others took part.

August 3, 1887.

Dr. David Sharp, M.B., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Fellows.

Mr. John Witherington Peers, M.A., of Wendover, near Tring; and Mr. R. G. Lynam, of the North Staffordshire

Infirmary, Stoke-on-Trent, were elected Fellows of the Society.

Exhibitions, &c.

Jonkheer May, the Dutch Consul-General, exhibited a pupa and two imagos of *Cecidomyia destructor* (Hessian Fly), which had been submitted to him for exhibition by the Agricultural Department.

Mr. W. White exhibited, and made remarks on, a specimen of *Philampelus satellitia*, Linn., from Florida, with supposed fungoid excrescences on the eyes. Mr. Stainton said he was of opinion that the supposed fungoid growth might be the pollinia of an Orchis. Mr. Poulton expressed a similar opinion, and the discussion was continued by Mr. Pascoe, Dr. Sharp, and others.

Mr. White also exhibited a specimen of *Catephia alchymista*, bred from a pupa collected by Mr. Ralfe last autumn on the South Coast.

Mr. M'Lachlan sent for exhibition a number of oak-leaves infested by *Phylloxera punctata*, Lichtenstein, which he had received from Dr. Maxwell Masters, F.R.S.

Mr. Champion exhibited two rare species of *Curculionidæ* from Sandown, Isle of Wight—*viz.*, one specimen of *Baridius analis*, and a series of *Cathormiocerus socius*. He remarked that *C. maritimus*, Rye, had been placed in recent European Catalogues as a synonym of the last-named species, but that this was an error. He also exhibited a series of *Cicindela germanica*, from Blackgang, Isle of Wight.

Mons. Alfred Wailly exhibited, and made remarks on, a number of living larvæ of *Antheræa pernyi*, *A. mylitta*, *Telea polyphemus*, *Platysamia cecropia*, *Actias luna*, *Attacus cynthia*, *Callosamia promethea*, and other silk-producing species. He also exhibited imagos of the above species, imagos of *Antheræa Yama-mai*, and a number of species of Diurni from Sarawak.

Mons. Wailly said he recommended the rearing of these silk-producing species in England on account of the beauty of the larvæ, and as an interesting entomological study; but not with a view to forming establishments of sericiculture, which, on account of the climate, would not be practicable. He further stated that some species, e.g., *A. mylitta*, would not

pair in a closed room, but only in the open air; whilst others, such as *Actias luna*, would pair in a closed room, and not in front of an open window.

Mr. Poulton exhibited crystals of formate of lead obtained by collecting the secretion of the larva of *Dicranura vinula* on 283 occasions. The secretion had been mixed with distilled water, in which oxide of lead was suspended. The latter dissolved, and the acid of the secretion being in excess, the normal formate was produced. Prof. Meldola promised to subject the crystals to combustion, so that their constitution would be proved by the final test.

Mr. Oliver Janson called attention to Mr. Pryer's new work, 'Rhopalocera Nihonica,' and to the fact that the illustrations had been executed by Japanese artists.

September 7, 1887.

Dr. David Sharp, M.B., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Mr. Goss said he was requested to inform the Meeting that in July last an Address to Her Majesty the Queen, on the occasion of the Jubilee of her Reign, had been authorised by the Council; that the preparation of the Address had been entrusted to a committee, consisting of Dr. Sharp and the Rev. W. W. Fowler; and that the following is a copy of such Address:—

"To the Queen's Most Excellent Majesty.

"We, the Honorary President, President, and Council of the Entomological Society of London, desire to approach your Majesty with sentiments of the most loyal devotion, and to tender our dutiful congratulations on the Jubilee of your Majesty's accession to the Throne; we rejoice in the great National progress that has been made under your benignant sway, and as a Society devoted to the advancement of Science we recognise with peculiar satisfaction the great development

that has taken place in all branches of scientific knowledge and their application to the improvement of the condition of your subjects.

"We fervently pray that the years to come of your Majesty's sway may be no less blessed, and that the intelligence and morality of your subjects may be continually strengthened."

Mr. Goss further stated that the Address, the copy of which he had just read from the Minute-book of the Council Meetings, was in due course forwarded by Mr. Fowler to the Home Secretary, who acknowledged its receipt in a letter, of which the following is a copy:—

"Whitehall, 28th July, 1887.

"Sir,—I have had the honor to lay before The Queen the loyal and dutiful Address of the Entomological Society on the occasion of Her Majesty attaining the Fiftieth Year of Her Reign; And I have to inform you that Her Majesty was pleased to receive the same very graciously.

"I have the honor to be, Sir,

"Your obedient Servant,

"Henry Matthews.

"The Rev. W. W. Fowler,

"The School-House, Lincoln."

Election of a Fellow.

Mr. Arthur Sidgwick, M.A., Fellow of Corpus Christi College, Oxford, of Woodstock Road, Oxford, was elected a Fellow of the Society.

Exhibitions, &c.

Mr. Jenner Weir exhibited a living larva of *Myrmeleon europæus*, which he had taken at Fontainebleau on the 6th of August last.

Mr. Elisha exhibited a series of bred specimens of both sexes of *Zelleria hepariella*, Stn., and also, on behalf of Mr. C. S. Gregson, a series of eighty varieties of *Abraxas grossulariata* selected from the specimens bred during the year 1886 from 4000 larvæ obtained from eggs laid by selected varieties, the results of crossing and interbreeding for more

than twenty years. Mr. Elisha stated that Mr. Gregson found the majority of the specimens he bred every season "threw back" to the original type, or differed therefrom so slightly as to be scarcely noticeable varieties; so that, although he was almost sure to get a few remarkable forms every season, he never yet had a batch of eggs that produced varieties alone, no matter how strongly marked or different from the type the parents were. Mr. Elisha said that about six or seven years ago he took at Dover some very dark-banded forms of *Cidaria suffumata*. One of the darkest specimens laid a batch of eggs, from which he expected to breed varieties, but not a single specimen of the dark form was produced, all the specimens reverting to the common or type form.

Mr. Stainton remarked that the female of *Zelleria hepariella* had until lately been considered a distinct species, and was known as *Zelleria insignipennella*, but directly Mr. Elisha began breeding the insect its identity with *Z. hepariella* was established.

Mr. Tutt exhibited specimens of *Crambus alpinellus*, *C. contaminellus*, *Lita semidecandrella*, *L. marmorea* (dark forms), and *L. blandulella* (a new species), *Doryphora palustrella*, and *Depressaria Yeatiana*, all collected at Deal during last July and August.

Mr. Stainton observed that *Crambus alpinellus* was so named from the earliest captures of the species having been made on the lower parts of the Alps, but that it had since been found on the low sandy ground of North Germany, and its capture at Deal quite agreed with what was now known of the distribution of the species in Germany. It was first recorded as a British species by Dr. Knaggs in 1871, from two specimens taken at Southsea by Mr. Moncreaff. Mr. Stainton further observed that he had named Mr. Tutt's new species "*blandulella*" from its similarity to a small *maculea*, of which one of the best known synonyms was *blandella*. He also remarked that Deal was a new locality for *Doryphora palustrella*, which had hitherto only been recorded from Wicken Fen and the Norfolk Fens in England, and from the neighbourhood of Stettin on the Continent.

Mr. Waterhouse exhibited, on behalf of Mr. Coote, a variety of *Lycæna phlæas;* also a number of *Stenobothrus rufipes*, and three specimens of *Coccinella labilis*, recently taken by himself at Herne Bay.

Mr. Martin Jacoby exhibited specimens of *Spilopyra sumptuosa*, Baly, and *Sybriacus magnificus*, Baly. He also exhibited several species of *Galerucidæ*, belonging to a genus which he proposed to call *Neobrotica*, closely resembling in shape and coloration certain species of *Diabrotica*, but differing therefrom as regards structural characters in the deep transverse groove of the thorax, and in the appendiculate and not bifid claws. Mr. Jacoby remarked that the similarity of the two genera in the elytral patterns, and even in the colour of the antennæ and legs, was very striking; and, as he had males and females of both genera before him, there could be no question on account of sexual differences. He added that the late Baron von Harold had described a *Galeruca* from Africa, which, except in generic characters, exactly resembled a South American genus (*Dircema*), and to which he drew attention at the time.

Papers read.

Dr. Sharp communicated a paper, by Mr. Thomas L. Casey, "On a new genus of African *Pselaphidæ*."

Mr. Bridgman communicated a paper entitled "Further Additions to the Rev. T. A. Marshall's Catalogue of British *Ichneumonidæ*."

Mr. Distant read a paper entitled "Contributions to a Knowledge of Oriental *Rhynchota*."

Mr. Enock read the following notes "On the Parasites of the Hessian Fly":—

"No doubt it will be within the recollection of many of the Fellows present here this evening that on the 4th August last there appeared in the 'Daily Telegraph' a long article upon the Hessian Fly, *Cecidomyia destructor* (Say), which—referring to the parasites of the species—concluded as follows, *viz.*:—'It is hoped that the Hessian Flies have not left these desirable travelling-companions behind them; but if they have, the corn-crops of this country

must, it is said, be protected by the colonisation of these useful little parasites.

"This may have satisfied 'arm-chair naturalists,' who are content to rely upon information gathered from other sources than those of practical experience in the field, and who, like 'feather-bed warriors,' copy the mistakes of others, which are again copied and handed down to posterity.

"After reading the article referred to, I determined to have a field day among the barley, for the express purpose of searching for the parasites of the Hessian Fly, which had not at that time been recorded as occurring in Great Britain. Mr. G. E. Palmer, of Revell's Hall Farm, Hertford, very kindly gave me permission to 'go anywhere I liked'; and the description and figure given by Miss E. A. Ormerod in her interesting pamphlet on 'The Hessian Fly' rendered it an easy matter to recognise the infected plants, which were very plentiful, among the poorly-grown barley.

"I had not been at work more than half an hour before I discovered unmistakable signs that the parasites were there, for in several infected stems I noticed that some had a small round hole about $\frac{1}{32}$ in. in diameter, and $\frac{1}{8}$ in. above the 2nd joint. I at once came to the conclusion that these holes had been made by some parasitic fly, and two days after (August 7th) I bred a male, on the 10th a female of the same species, and the following day another male of a different genus. Since that date I have bred a number, two of which I sent to Mr. E. A. Fitch, who replied,—'the "spotted leg" is an *Eupelmus*, and may be identical with Lindemann's *Eupelmus Karschii;* and the other, a *Pteromalus*, may be *Semiotellus nigripes* of Lindemann, but at present it is not safe to go beyond family and genus.'

"I have not yet had an opportunity of submitting to Mr. Fitch specimens of the other parasites bred, which I think I am right in saying comprise four or five species of *Semiotellus*, one *Eupelmus*, and a very small semiapterous species. Some of these parasites I kept alive for nearly three weeks in pill-boxes—in which I placed a piece of damp blotting-paper, and a few infected stems and loose puparia,—where they soon made themselves quite at home, running about briskly in

the sunshine, and in dull weather hiding away down the hollow stems. I have been enabled to note down a number of observations upon them, but have not had leisure to put them into form.

"I paid another visit to Revell's Hall on August 8th, commencing my search in another very large barley-field, and, in order to form some sort of an estimate as to the extent of the injured barley, I proceeded to mark out a distance of 20 yards; I then walked up the rows, carefully examining the one between my feet and the three at each side, cutting and counting the infected straws, and placing them in a bag. Having arrived at my distance-post, I noted down the result of each 20 yards worked; this I continued to do for just four hours. I then measured the width of ground worked, and found it to be just 80 yards; in this small space, 80 × 20 yards, I had cut over 800 infected straws, each containing from one to four puparia. I believe that twice that number were infested, for I noticed many plants looking very 'seedy,' though the ears were anything but seedy; these were not bent down, but on cutting them I found puparia in the usual place—just above the 2nd joint. You will observe that these ears only contain from six to eight poor grains, instead of nearly thirty, the average number, in a healthy plant. A little time was lost during the four hours above-mentioned in frequently taking off my coat, to free it of the quantity of the irritable barley-ears, which, as everyone knows, have such a knack of working their way up one's sleeves, &c.

"We have all read from time to time that 'the Commission appointed' duly report to Parliament in how many counties the crops have been attacked; but, so far, we have not heard whether any practical steps have been taken to check the progress of the Hessian Fly, or prevent its reappearance next year. I venture to think something might have been done by collecting the infected straw, instead of burning it, so that the parasites might be bred and 'turned down' in infected localities; we know they would not require any 'red tape' to induce them to do their appointed duty. I do not apprehend that this would be too great an undertaking for the Government, for it is obvious that if one person can in four

hours collect over 2000 puparia, fifty people could collect a proportionately larger number, and there would be so many less left to work future damage.

"Another thing which I believe is much wanted,—in which opinion I am supported by Mr. G. E. Palmer,—is, that every farmer should be supplied with a good figure of an infected plant, for several farmers with whom I have conversed upon the subject are totally ignorant as to the appearance of a plant when attacked; and one said to me 'We hear a deal about this Hessian Fly, but we don't know what it's like or what to look for.' Such being the case, an official report is of little value to the farmers.

"Among the many letters which have appeared in the press I think the following from the 'Mark Lane Express,' headed 'Where the Hessian Fly came from,' and signed 'English Farmer,' deserves attention:—'If any of your readers want to know from whence this pest is coming, they have only to examine the straw that is now being imported into this country to satisfy themselves. Only a fortnight ago I examined some rough straw lying in No. 1 Princess Dock-shed, Hull, and found it badly infested,' &c. If the above statement is correct, all remedial measures will be useless so long as infected straw is allowed to be imported.

"I must apologise for these somewhat disjointed notes, and at some future time I will endeavour to give more detailed accounts of my observations both on the Hessian Fly and its parasites."

Mr. Enock exhibited specimens of injured barley; and a discussion ensued, in which Dr. Sharp, Mr. Jacoby, Mr. Billups, Mr. Waterhouse, and others took part.

October 5, 1887.

Dr. David Sharp, M.B., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Exhibitions, &c.

Mr. Jacoby exhibited a species of *Aphthonoides*, a genus of Halticina, having a long spine on the posterior femora. He also exhibited a specimen of *Rhagiosoma madagascariensis*, and remarked that it had the appearance of a Longicorn.

Mr. Stevens exhibited a very dark specimen of *Crambus perlellus*, from the Hebrides, which its captor supposed to be a new species.

Mr. Porritt remarked that this brown form of *Crambus perlellus* occurred at Hartlepool with the ordinary typical form of the species, and was there regarded as only a variety of it.

Mr. Slater exhibited a specimen of *Gonepteryx Cleopatra*, which was stated to have been taken in the North of Scotland.

Mr. Jenner Weir remarked that he had found larvæ of *Gonepteryx Rhamni* upon *Rhamnus alaternus* (not a British species), and reared them from it. As this shrub was commonly imported from the Continent for horticultural purposes, it seemed to him probable that the eggs or young larvæ of *Gonepteryx Cleopatra* might be easily introduced. He further observed that the deposition of its ova by *Gonepteryx Rhamni* on *Rhamnus alaternus* was a remarkable instance of instinct; for although the shrub in question was undoubtedly a suitable food-plant for the species of *Gonepteryx*, it was very unlike the two common species of the genus *Rhamnus—frangula* and *catharticus*—both in appearance and character, being an evergreen with bright glossy leaves, and the two latter species being deciduous.

Mr. South exhibited an interesting series of about 150 specimens of *Boarmia repandata*, L., bred in 1876 and during the present year from larvæ found feeding on bilberry and heather in a small wooded glen on the coast, not far distant from Lynmouth, North Devon. Mr. South remarked that the present sylvan character of the locality might to a very large extent be considered artificial, inasmuch as the oak trees which now contribute so greatly to its beauty were without doubt planted. Prior to the introduction of the oaks probably the only arboreous plants which existed there were birches and sallows, similar to those now observed in some other

portions of Exmoor; the connection between which and the locality referred to was only interrupted here and there by an occasional strip of cultivated land. Between these patches of arable land are broad areas of common covered with heather, gorse, and bilberry. Large detached masses of rock lie scattered here and there along the sides and at the bottom of the glen, which are now almost entirely covered by vegetation. At the shore end, however, the rocks, which belong to the Middle Devonian system, and consist of red and grey grit, shales, and sandstones, stand out clear and bold. The series of specimens exhibited included strongly-marked examples of the type-form; an extreme form of var. *conversaria*, Hüb., a form intermediate between the type and the last-named var.; examples of var. *destrigaria*, Steph.; and another form, believed by Mr. South to be the issue of a cross between the var. *conversaria* and the var. *destrigaria*. In support of this suggestion Mr. South said that in 1883 he bred about equal numbers of the type and *conversaria* forms from ova deposited by a banded female, which he had every reason to suppose had paired with a typical male. It was apparent, on looking at the entire series, that the extreme forms were in each case connected with the type by intermediate forms and their aberrations.

Mr. E. B. Poulton exhibited young larvæ of *Apatura iris*, which had been beaten off sallow in the New Forest. He also exhibited eight larvæ of *Sphinx convolvuli*, of which seven were in the fourth stage and one in the third. A female moth, captured in S. Devon by Mr. Pode, laid eighteen eggs on August 29th; all except one of these produced larvæ by September 9th, and up to the date of the meeting only a single larva had been lost. Mr. Poulton said the life-history had been of extreme interest, throwing much light upon that of *Sphinx ligustri*, as well as upon difficult points in the ontogeny of the allied genera, *Acherontia* and *Smerinthus*.

Mr. Stainton commented on the interesting nature of the exhibition, and said he was not aware that the larvæ of *Sphinx convolvuli* had ever before been seen in this country in their early stages.

Mr. M'Lachlan remarked that females of this species

captured on former occasions, when the insect had been unusually abundant, had been found upon dissection to have the ovaries aborted.

Mr. R. W. Lloyd exhibited two specimens of *Elater pomonæ* and one of *Mesosa nubila*, recently taken in the New Forest.

Mr. Porritt exhibited a series of melanic varieties of *Diurnea fagella* from Huddersfield, and he stated that the typical pale form of the species had almost disappeared from that neighbourhood.

Mr. Dannatt exhibited a specimen of the so-called "Vegetable Caterpillar," from New Zealand.

Mr. Goss exhibited, on behalf of Mr. John Brown, of Cambridge, a number of puparia of *Cecidomyia destructor* (the Hessian Fly), received by the latter from Whittlesford and Wilbraham, Cambridgeshire; from Long Stratton, Norfolk; from Bury St. Edmunds, Suffolk; and from Wiltshire. He also exhibited a living larva of *Cephus pygmæus*, Lat. (the Corn Sawfly), which had been submitted to Mr. Brown by Mr. Charles C. Ambrose, of Swaffham Prior, Cambridgeshire, who reported that the species had been doing considerable damage this year to wheat-crops in Burwell Fen.

Mr. Verrall, in reply to a question by Mr. Enock, said he believed that the Hessian Fly was not a recent introduction into Great Britain, but had been here probably for hundreds of years; and that twelve years ago he had included the species in a list of British Diptera which he had compiled. He believed the reason of its not having been recorded years ago was that the damage done by it was insignificant, and that until the recent period of agricultural depression the British farmer did not trouble himself about small grievances.

Prof. Riley, in answer to the question as to the probable date of the introduction of the species in this country, said there were probably as many conflicting views on the subject as had been expressed about its first appearance in America. These were based on the facts that American grain-growers had been practically unfamiliar with it prior to 1777; that its injuries on Long Island followed the landing of Hessian troops in the summer of that year; that its subsequent progress westward at the rate of fifteen or more miles a year was distinctly traced and

recorded; and that Col. G. Morgan (who wrote most intelligently about it at the time) claimed, in his letter of August 26th, 1788, to Sir John Temple, to have given it the name of 'Hessian Fly.' The consensus of opinion on the other side of the Atlantic had been with Fitch, who followed contemporary conviction at the time of the insect's first injury, and held that it had been imported into America by the Hessian troops; Balthazar Wagner, however, in an admirable paper (1861) argued that it could not have been imported by the Hessians, his reasons being that, as had been long previously shown, it was not known to occur in Hesse, and that the historic evidence as to the times of departure and arrival of the troops taken together with the life-history of the insect rendered such importation highly improbable, or, as he puts it, out of the question. Hagen (1880 and 1885), following Wagner, used the same facts and arguments, and added some further historic data; but, with more bibliographic zeal than biologic acumen, he went farther, and claimed that it was never imported, but was indigenous to America.

Prof. Riley said it would extend his observations beyond reasonable limits to enter into the details on which he based his own conviction, which had been substantially expressed in the full paper by Packard in the 'Third Report of the United States Entomological Commission (1883).' His opinion was that while we might drop the Hessian theory,—since Mr. Henry Phillips, jun., as quoted by Hagen (1885), finds mention of the "Hessian Fly" in the unpublished minutes of the American Philosophical Society for 1768 (a rather astonishing fact, as it antedates the landing of the Hessians!),—and concede that the insect was introduced some time prior to the revolution, yet that its introduction *about* that time must be accepted, because Hagen's arguments to the contrary were not supported by evidence.

Prof. Riley further remarked that he had referred to these conflicting views of leading writers as to the original source and time of introduction of the insect into America, not so much to foreshadow the future conflict of opinion on similar points in England as to bring out this important fact as a warning to hasty generalisers, *viz.*, that the arguments of

Wagner, Hagen, &c., against its introduction into America, were inherently weak from the biologic side. They are based on the average or normal period of summer development of about seven weeks from egg to adult, *and ignore the important bearing of exceptional retardation in development whereby the puparia of one summer remain latent and only give forth the flies in the spring or early summer of the ensuing year.* This fact, recognised by Harris (1852), Prof. Riley said he had evidence of in America in garnered straw, and it was proved by Wagner himself to have occurred in Germany in field-stubble. It was more apt to occur, however, in straw kept dry and packed than in stubble or exposed straw, and is in keeping with many other similar cases of retarded development in insects, some remarkable instances of which he called attention to before the American Association for the Advancement of Science in 1881. It destroyed Hagen's main argument, rendered the introduction of the species possible at almost any season, and made its introduction to America by the Hessians who left Portsmouth April 7th and landed June 3rd, 1777, on Staten Island, quite probable and plausible from biologic grounds. All the facts as to the history of the insect in Great Britain indicated its recent introduction. The lengthy inquiry carried on at the request of the Privy Council by Sir Joseph Banks a century ago, a full record of which will be found in Young's 'Annals of Agriculture,' &c. (vol. xi., 1789, pp. 406–613), proved quite conclusively that the insect was not here then; and there was no reason to suppose that since then it would long have eluded detection whether by intelligent farmers, or by entomologists like Kirby, Curtis, and Westwood. The first authentic record of its appearance in this country was that by Miss E. A. Ormerod last year (1886), and, as so often happens after the first announcement of a discovery, when public attention has been strongly called to a subject, hosts of observers have been on the *qui vive* for the insect who would otherwise never have looked for it. As a consequence it had been detected during the past summer along the eastern coast up into Northern Scotland; and this wide distribution would indicate that it had been at work unnoticed for some years previous to 1886, though it may also be accounted for by the

simultaneous import of infested straw from some given locality into various ports along the coast. Prof. Riley said this last view was rather confirmed by the balance of the evidence and the statistics of straw importation, which, so far as he had been able to get at them, showed that straw is brought into Great Britain chiefly from France and Holland, and is carried almost entirely into eastern ports, the port of Glasgow (which reaches so near the eastern coast) being the only notable exception. Much of the straw is also used for manure and distributed by rail. The fact that the insect is yet confined to the eastern counties is also confirmatory of its recent advent; for, had it been long in the country, we should expect it to be uniformly distributed over the grain-growing parts of the island. The testimony of farmers who think they saw the insect in years gone by (there have already been such, and there will be others!) is rarely, if ever, to be depended on; while entomologists who argue its indigenous character from the general ignorance of, or indifference to, the *Cecidomyidæ* on the part of British Dipterists, or from the difficulty of separating the species of the genus *Cecidomyia* in the adult state, forget how unique in appearance and easily discerned the puparium is, and put mere opinion against established fact. In conclusion, Prof. Riley said he believed that the Hessian Fly had, beyond question, been introduced into England since Curtis's time, and probably within the past three or four years.

Mr. Verrall, in reply to a further question, said he admitted that he had no direct evidence in support of the opinion he had expressed that the Hessian Fly had been in this country for a great number of years. He called attention to a recent paper on the Hessian Fly in Essex by Mr. J. M. Campbell, in which it was stated that Miss Ormerod had found the puparia of the species in some straw imported from Belgium. As a matter of fact, however, the insect was not known to occur in Belgium. Mr. Verrall further said that he thought it improbable that Mr. Enock would be able to recognise the perfect insect "off-hand," as there were perhaps nearly 250 British species of *Cecidomyidæ*, all minute, and many so closely allied as to be almost indeterminable unless bred, or examined when alive.

Mr. M'Lachlan, Mr. Elwes, Mr. Jacoby, and Dr. Sharp continued the discussion.

Papers read.

Mr. James Edwards communicated the second and concluding part of his "Synopsis of British *Homoptera-Cicadina*."

Professor Westwood contributed "Notes on the life-history of various species of the Neuropterous genus *Ascalaphus*."

Mr. Elwes read a paper "On the Butterflies of the Pyrenees," and exhibited a large number of species which he had recently collected there.

Mr. M'Lachlan said he spent some weeks in the Pyrenees in 1886, and was able to confirm Mr. Elwes' statements as to the abundance of butterflies in that part of the world. He remarked on the occurrence of Spanish forms in the district, and on the absence, as a rule, of the peat-bogs so common in the Swiss Alps. The discussion was continued by Mr. Distant, Mr. White, Dr. Sharp, and others.

November 2, 1887.

Dr. David Sharp, M.B., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Exhibitions, &c.

Mr. Stevens exhibited a specimen of *Acidalia immorata*, L., of which an example was purchased by him some years ago at the sale of the collection of the late Mr. Desvignes. Mr. Stevens remarked that specimens of this insect, lately captured near Lewes, had been described last month in the 'Entomologist's Monthly Magazine' and 'Entomologist' by Mr. J. H. A. Jenner as a species new to Britain.

Mr. Jenner Weir remarked that, as Mr. Desvignes was an old friend and correspondent of the late Mr. Hopley, who formerly lived at Lewes, it was probable that his specimen of *Acidalia immorata* came from the same locality as Mr. Jenner's specimen.

Mr. Adkin exhibited, and made remarks on, a series of

male and female specimens of *Arctia mendica* from County Cork; he also exhibited, for comparison, two specimens of *A. mendica* from Antrim, and a series of bred specimens from the London District. Some of the males from Cork were as white as the typical English females, but the majority of them were of a smoky-white colour, intermediate between the form last mentioned and the typical English form.

Mr. Enock exhibited an example of a species of Hemiptera —*Calocoris bipunctatus*—containing an internal parasitic larva.

Dr. Sharp exhibited three species of Coleoptera new to the British list, viz.:— 1. *Octhebius auriculatus*, Rey, found by Messrs. Champion and Walker some years ago in the Isle of Sheppey, but described only quite recently by M. Rey from specimens found at Calais and Dieppe. 2. *Limnius rivularis*, Rosenh., found by the late Dr. J. A. Power at Woking; the species, though not uncommon in Southern Europe, had not, he believed, been previously found farther north than Central France. 3. *Tropiphorus obtusus*, Bonsd., taken by himself on the banks of Water of Cairn between Irongray and Dunscore, Dumfriesshire; he had considered previously that this might be the male of *T. mercurialis*, but M. Fauvel, who was studying the European species of the genus, informed him this was not the case, and he had no doubt was correct in his view. He also exhibited a *Goliathus*, recently described by Dr. O. Nickerl as a new species, under the name of *G. atlas*, and remarked that the species existed in several collections, and had been supposed to be possibly a hybrid between *G. regius* and *G. cacicus*, as its characters appeared to be exactly intermediate between those of the two species named. Dr. Sharp also exhibited a living example of the mole-cricket, *Gryllotalpa vulgaris*, from Southampton; between the spines of its hind legs were a number of living Acaridæ, placed in a symmetrical manner, so as to appear as if they formed a part of the structure of the limb.

Mr. Eland Shaw exhibited two species of Orthoptera which had been unusually common this year, viz., *Nemobius sylvestris* from the New Forest, and *Tettix subulatus* from Charmouth, Dorset.

Mr. E. B. Poulton exhibited the cocoons of three species

of Lepidoptera in which the colour of the silk had been controlled by the use of appropriate colours in the larval environment at the time of "spinning up." Mr. Poulton said this colour-susceptibility had been previously proved by him in 1886 in the case of *Saturnia carpini*, and the experiments on the subject had been described in the Proc. Royal Society, 1887. It appeared from these experiments that the cocoons were dark brown when the larvæ had been placed in a black bag; white when they had been freely exposed to light with white surfaces in the immediate neighbourhood. Mr. Poulton stated that the other two species subjected to experiment during the past season afforded confirmatory results. Thus the mature larva of *Eriogaster lanestris* had been exposed to white surroundings by the Rev. W. J. H. Newman, and cream-coloured cocoons were produced in all cases; whilst two or three hundred larvæ from the same company spun the ordinary dark brown cocoons among the leaves of the food-plant. In the latter case the green surroundings appeared to act as a stimulus to the production of a colour which corresponded with that which the leaves would subsequently and permanently assume. Mr. Poulton further stated that he had more recently exposed the larvæ of *Halias prasinana* to white surroundings, and had obtained a white and a very light yellow cocoon, far lighter than the lightest of those met with upon leaves. The larva which spun the white cocoon had previously begun to spin a brown one upon a leaf, but upon being removed to white surroundings it produced white silk.

Mr. Stainton suggested that larvæ should be placed in green boxes, with the view of ascertaining whether the cocoons would be green. He understood that it had been suggested that the cocoons formed amongst leaves became brown because the larvæ knew what colour the leaves would ultimately become.

Mr. Poulton, in reply, said that, so far from the larvæ having any choice or intelligence in the matter, he felt convinced that the whole process was entirely involuntary, and that the susceptibility had arisen through the action of natural selection upon favourable variations.

The discussion was continued by Mr. Waterhouse, Dr. Sharp, Mr. M'Lachlan, and others.

Mr. Klein exhibited a number of living larvæ of *Ephestia Kühniella*, which he said had been recently doing great damage to flour in a warehouse in the east of London.

Papers read.

Mr. Sydney T. Klein read the following "Notes on *Ephestia Kühniella*":—

"In May last I discovered a colony of this scourge of Mediterranean ports in some large warehouses in the east-end of London. There were over a thousand tons of flour stored in close proximity, and, under my direction, great efforts were made to prevent the larvæ from spreading. In spite of fumigating with sulphur and hot-liming the floors, ceilings, and walls (practised continually for several days), by which means enormous numbers of the imagines were killed, they spread with great rapidity, until one entire warehouse was literally smothered with larvæ, and several hundred pounds' worth of damage was done. The flour was so intermingled with the larvæ-threads that it was rendered unfit for even pig or cattle food. The ova, which seemed to be deposited by the imagines generally upon the top of the sack, hatched within a few days of being laid, and the larvæ, at once burrowing through the sacking, commenced spinning long galleries in the flour, seldom, however, going more than three inches from the exterior. I have brought specimens of these galleries, the network very much resembling wool. The larvæ, which were full-fed in about three weeks, then made their way to the surface, and could be seen in myriads crawling along the floor and up the walls of the warehouse, till they reached the angle where the roof met the walls. There they spun compact silken cocoons, in which they turned to the pupa-state. Their migratory habits, when full-fed, were very extraordinary; nothing seemed to keep them within bounds. I had a colony of some thousands at my house, in order to make experiments how to exterminate them; but I found that my breeding-cages, with the finest meshed wire, were useless to restrain

them. I then placed them under a large glass shade on a polished wooden surface with no perceptible outlet, but it was no use ; the corners and ceiling of my room were within a week studded with their cocoons, and every day specimens of the larvæ were discovered in different parts of the house, from top to bottom ; in fact, they increased and wandered to such an alarming extent that I had to give up keeping them. The colony was therefore delivered over to the tender mercies of about fifty game and Plymouth-rock hens, which are kept at the bottom of my garden. The evident appreciation with which these plump larvæ were greeted at once suggested a remedy for exterminating those in the warehouse ; a great number of hens was therefore requisitioned from the neighbourhood in the east-end, and it was encouraging to see the enormous quantities consumed. But the hens began to flag after ten minutes of gorging, and, although they were kept in the warehouse for several weeks, the insects still continued to increase and spread to other granaries. The case was referred to many able entomologists and scientists, but no effective remedy was forthcoming, and it seemed as though many thousands of pounds' worth of goods would be involved. Science having failed to find a remedy, it remained for Nature to step in with those wonderful antidotes which she always has in store for counteracting any over-production of the fauna or flora under her charge. I held an inspection in August, and brought away several of the full-fed larvæ for examination, as I noted some irregular markings which had not been noticed before. These larvæ seemed to pupate quite regularly, and I did not suspect the state of the case till I went down again at the beginning of September. No sooner had I entered the warehouses than I noticed a most extraordinary change in the appearance of the large piles of flour. On closer examination I found this appearance was caused by enormous numbers of a small black fly, the ovipositor of the female of which clearly showed that it belonged to the *Ichneumonidæ* ; and, upon examining several of the larvæ, the majority of which had markings on their backs, the startling fact was established that Nature had come to the rescue and provided the remedy herself. It

is very rarely that such a striking example of Nature's wonderful counterbalancing powers is discovered."

Mr. A. G. Butler contributed a paper "On the species of the Lepidopterous genus *Euchromia*, with descriptions of new species in the collection of the British Museum."

Lord Walsingham communicated the following "Note," substituting the generic name *Homonymus* for the generic name *Ankistrophorus* used in his "Revision of the genera *Acrolophus* and *Anaphora*."

"Homonymus.

'Ομώνυμος = homonymous.

= § *Ankistrophorus*, Wlsm., Trans. Ent. Soc. Lond., 1887, p. 146.

Type. *Ankistrophorus corrientis*, Wlsm.

The generic name *Ankistrophorus*, used on pp. 140, 146, and 172, &c., in my Revision of the genera *Acrolophus* and *Anaphora*, is found to be preoccupied by the more correctly-spelt name *Ancistrophora*, Schin. (in the order of Diptera). I am therefore desirous to correct this error by substituting for *Ankistrophorus* the generic name *Homonymus*, to be used throughout the paper, and in all references to this genus. The name is calculated to recall the circumstances under which such correction has been made."

December 7, 1887.

Dr. David Sharp, M.B., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Fellows.

Mr. C. E. Stanley-Phillips, of Shooter's Hill; Mr. H. W. Barker, of Peckham; and Herr E. G. Honrath, of Berlin, were elected Fellows.

Exhibtions, &c.

Mr. Jenner Weir exhibited specimens of *Cicadetta hæmatoides* from the New Forest, and remarked that he believed they were found nowhere else in England; that usually

two or three specimens were taken each year, but that in the present year they had been commoner, probably in consequence of the heat and drought of the past summer. Mr. Weir stated that he had received twelve specimens of this insect from Charles Gulliver, of Ramnor Cottage, Brockenhurst. Of this number three were taken in one morning and nine in another; and, although the particular locality was subsequently searched for them, no others were found. He added that Charles Gulliver had informed him that he was attracted to the insect by hearing the singing of the male, but out of the twelve taken one only was a male. It would therefore appear probable that the males are more active than the females, and quickly retreat when disturbed, leaving the females behind. The males had not been selected from the females before Mr. Weir received the specimens, as Gulliver assured him that the dozen exhibited were all the family had collected during the past season.

Mr. M'Lachlan exhibited a specimen of *Pterostichus madidus*, F., which he had found in a potato. It seemed questionable whether the beetle had been bred in the cavity or had entered it for predaceous purposes. Mr. Theodore Wood, Mr. Kirby, and Mr. Herbert Cox took part in the discussion which ensued. Mr. M'Lachlan also exhibited two specimens of a species of Trichoptera — *Neuronia clathrata*, Kol. — which occurred rarely in Burnt Wood, Staffordshire, and elsewhere in the Midlands. On enquiry he was informed that the two specimens exhibited had been found in the Tottenham Marshes by Mr. C. J. Boden.

Mr. Porritt exhibited a series of specimens of *Cidaria russata*, from Yorkshire, the Isle of Man, the Hebrides, and the South of England. The specimens from the two first-named localities were almost black.

Mr. Verrall exhibited a specimen of *Mycetæa hirta*, Marsh., which was found devouring a champagne cork. The Rev. Canon Fowler remarked that certain *Cryptophagi* had the same habit.

Mr. M'Lachlan asked whether the cork or the alcohol attracted the insect? Mr. Jenner Weir, Dr. Sharp, and Mr. Verrall continued the discussion.

Canon Fowler exhibited specimens of *Acronycta alni* and *Leiocampa dictæa*, which came to the electric light on Lincoln Cathedral during the Jubilee illuminations. He also exhibited a specimen of *Harpalus melancholicus*, Dej., from Kingsgate.

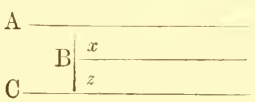
Mr. Billups exhibited, for Mr. G. C. Bignell, of Plymouth, a case of British oak-galls, as also their makers, and in some cases the parasites. Amongst others there were *Spathegaster baccarum*, *aprilinus*, and *vesicatrix*, *Neuroterus numismatis*, *læviusculus*, *Ostreus fumipennis* and *lenticularis*, *Dryophanta longiventris*, *agma*, and *scutellaris*, *Aphilotrix sieboldi*, *radicis*, *albopunctata*, *corticis*, *gemmæ*, &c., *Andricus terminatus*, *Cynips Kollari*, and many others. He also exhibited the cocoon and pupa-case of a South American moth, from which he had taken 140 specimens of a parasite of the genus *Smicra*, showing the enormous fecundity of this species of *Ichneumonidæ*.

Mr. O. Janson exhibited, for Mr. C. B. Mitford, a collection of Lepidoptera from Sierra Leone.

Mr. White exhibited a female specimen of *Composia olympia*, Butl., from Florida. He also exhibited, for Mr. Ralfe, a curious structure formed by White Ants at Akyab, Burmah.

Mr. Waterhouse exhibited a series of wings of insects, with drawings and also diagrams, in which he had coloured the veins in accordance with what he believed to be the homologies. He said that he found Dr. Adolph's three memoirs on insects' wings, in the 'Nova Acta d. ksl. Leop.-Carol.-Deut. Akademie' for 1879, 1884, and 1885, were not sufficiently known in England, and he therefore briefly explained the theory propounded by that author; and also called attention to Herr Redtenbacher's paper (in the 'Ann d. k. k. Naturh. Hofmuseums zu Wien,' 1886) on the same subject. A primitive wing would in a manner somewhat resemble a fan, each fold of the fan being furnished with a longitudinal vein, with numerous transverse veins uniting the longitudinal ones. There were, then, two series of veins, an upper series (termed convex veins), and a lower series (termed concave veins). Perhaps the nearest approach to such a wing would be the wing of a locust, or an *Ephemera*, which Mr. Waterhouse considered an excellent type. Of the two series of

veins the lower veins are the weaker and the more liable to disappear, and in some cases (*e. g.*, in Hymenoptera) they are absent. When an upper vein is absent its course can frequently be traced by the presence of a convex fold or ridge, and there is often a dark spot on the transverse nervures through which it has passed. If a lower vein is absent its course can generally be traced by a pale impressed line or concave fold, and a pale spot is frequently left in the transverse veins through which it has passed. Mr. Waterhouse believed that this theory would not improbably lead to the determination of the homologies of the veins, although there was much yet to learn. He pointed out that both the convex and concave veins might fork or branch as they approached the margin of the wing; and when, as the branches diverge, they would become widely separated, a vein was usually found between them: a concave vein between the two branches of a convex vein; a convex vein between the branches of a concave vein. A convex vein could never cross a concave vein, or *vice versâ*, and, although in some cases they appeared to do so, the apparent crossing could always be accounted for in some other way. It was also important to bear in mind that the longitudinal veins were often rendered zigzag by being drawn out of the line by the transverse nervures; and also that the longitudinal veins, distinct in their origin, become united by the transverse nervures; thus a vein B running between two others A and C, united to A and C by the nervures *x* and *z*, might become united to and appear as a branch of A or C, according to which of the nervures *x* or *z* became obsolete.



Mr. Champion inquired if Mr. Waterhouse had examined the wings of any of the Coleoptera.

Mr. Verrall asked if a convex vein was not sometimes placed over a concave one.

Mr. Waterhouse, in reply to Mr. Champion, said he had not examined any wings of Coleoptera; and, in reply to Mr. Verrall, he said these veins often closely approximated, but he did not think they ever ran one over the other.

Mr. M'Lachlan remarked on the differences in the terms hitherto used for different families with regard to the neuration of the wings, and he observed that in some points the neuration of the wings of the Trichoptera and Lepidoptera agreed; and he called special attention to one or two species of Lepidoptera (of which Mr. Waterhouse exhibited drawings) as being most remarkable.

Mr. Poulton, Dr. Sharp, Mr. Verrall, and Mr. Waterhouse continued the discussion.

Papers read.

Mr. G. T. Baker contributed "Descriptions of new species of Lepidoptera from Algiers."

Mr. Gervase F. Mathew, R.N., communicated a paper entitled "Life-histories of Rhopalocera from the Australian Region." The paper was accompanied by elaborate coloured drawings of the perfect insects, their larvæ and pupæ.

Mr. Frederic Merrifield read a "Report of Progress in Pedigree Moth-breeding, with observations on incidental points." He also exhibited a large number of specimens of *Selenia illunaria*, showing the results of the experiments he had been making. He said that, having obtained plenty of living specimens of *S. illunaria* in the spring, his experiments with that species were more advanced than with *S. illustraria*. From eggs of *illunaria* laid by moths taken in the spring he had reared a second generation fed on sleeved birch trees, the moths emerging in July. From these he had made a selection of long-winged (A), medium-winged (M), and short-winged (Z) pairs, and from each of these pairs he had batches of pupæ numbering from 60 to 100, now hybernating. Besides the insects thus reared under natural conditions, he had reared some which were kept during all their stages in an artificial temperature averaging a little under 80° Fahr. In this way he had obtained four successive generations, and from the last of them, being the fifth generation of the year, counting a generation as beginning with the egg (the moths caught in the spring reckoning as belonging to the first), he had three selected broods, comprising between 200 and 300

larvæ, now feeding, some few being nearly full-fed. The forced second generation was distinctly larger than the same generation sleeved, and each successive forced generation showed a measurable increase in size over its predecessor. From the forced second generation he had selected A, M, and Z pairs, from each of which he had reared a number of moths, but the A's and Z's in this third generation failed to produce fertile eggs, though several pairs of each were tried. The M's produced abundantly, and from one of these M pairs he bred 61 moths, from which he had again selected A's, M's, and Z's, which laid fertile eggs, and from these pairs he had the three broods of larvæ above referred to as now feeding, some of which he exhibited. He refrained at present from any inferences as to the cause of the sterility of the third generation of forced moths in the A, M, and Z lines, but thought it would be prudent in continuing these experiments to include some selections from points considerably short of the extremes in size. All the successive generations were of the summer type (*Juliaria*). In all the female was, on the average, sensibly larger than the male, but in the natural spring emergence the reverse was the case. *S. illunaria* was the only English double-brooded Geometer, except perhaps *T. laricaria*, which had one of its emergences in a winter month, and he threw out the suggestion whether the relatively smaller size of the female in the first emergence might be a step towards or a remnant of apterousness, usual in the female of our winter moths. It would be interesting to breed and compare *T. laricaria*. He could not undertake any other species than *illunaria* and *illustraria*, and circumstances might interfere even with them; and as the experiments with them must continue for many generations in order to reach the results wanted for Mr. Galton's purposes, and required uninterrupted watchfulness, it was essential, to prevent an accidental failure, that there should be a second line of experiments conducted independently. Both species were very easy to rear, and offered much scope for experiment in various directions; he would gladly supply eggs in the spring for the purpose. Mr. Merrifield further said he should be glad to be afforded the opportunity of seeing and, if

judged expedient, breeding from unusual varieties or types of either species, or examples from Ireland, Wales, Northern regions such as Scotland and Scandinavia, where both species appear to be single-brooded, or from Central or Southern Europe. *S. lunaria* would be an interesting subject; and he should like to know whether in the resting position it approximated to *illunaria*, which folds its wings closely together like a butterfly, or to *illustraria*, which holds them at an angle of 50° or 60°. He exhibited two diagrams, one showing the measurements of the successive broods, and the other the duration of the larval and other stages in each; also a number of specimens of each brood of *illunaria*, and several of *illustraria*.

Mr. Francis Galton alluded to the close attention Mr. Merrifield had given to the subject, and complimented him on the neatness, ingenuity, and skill with which he had conducted his experiments, which he considered were of a very high order. He hoped that other members of the Society would assist Mr. Merrifield by making similar experiments. Mr. Galton said his own part of the work had not yet commenced, but he hoped to begin it next March. He made some observations on acquired faculties, and on the possibility of mutilations being inherited. He believed that mutilations in the legs of larvæ affected the legs of the moth.

Prof. Meldola expressed his admiration of the manner in which Mr. Merrifield had conducted these experiments, and hoped that they would be successfully continued. He suggested that the opportunity afforded by such wholesale experiments should be utilised for the purpose of getting accurate measurements of the relative variability of certain selected characters in the moth, in addition to the size, which character only was required for Mr. Galton's purpose. Thus, by carefully measuring the length of the antennæ, the distance between certain definite markings on the wings, &c., in all the individuals of several distinct broods, data would be obtained for expressing numerically the relative amount of variability of the parts stated in terms of the mean or average measurement. Observations of this kind had been conducted on birds by Mr. Allen in North America,

and had served to show the extreme relative variability of all the parts. Accurate measurements of this variability were much needed for large numbers of individuals belonging to widely different species in as many diverse groups of the Animal Kingdom as possible. By this means naturalists would in the future be better able to realise the degree of plasticity of different organisms. Such information, which might well be supplied by entomologists for insects, would be of great value as a contribution to the theory of Natural and Sexual Selection.

Mr. Poulton said he was much interested in the results of Mr. Merrifield's experiments. He was extremely astonished to learn that an insect parasite and a perfect, although much dwarfed, imago had been bred from a *Selenia* pupa. At the same time he remembered that Prof. Westwood had shown him a dipterous parasite which had escaped from a cocoon of *Trichiosoma lucorum*, and from which the hymenopterous insect had also emerged. Mr. Poulton thought that Mr. Merrifield's experiments offered a most favourable opportunity for practically testing whether acquired characters can or cannot be transmitted. It was well known that certain larval organs were the morphological equivalents of the corresponding pupal and imaginal structures. Thus Mr. Poulton had found that when the six ocelli of a lepidopterous larva had been destroyed, the compound eye was not developed in the pupa or in the imago. If any one of the larval thoracic legs were cut off, the corresponding leg would almost certainly be absent in the two later stages. Among all previously recorded cases there had been no instance in which the effects of mutilation had been proved to be transmissible to offspring. Prof. Weismann, of Freiburg, had lately given many reasons for believing that the transmission of acquired characters (such as mutilations) cannot take place. But, as Mr. Francis Galton had said, in all such previous cases the injury had been inflicted comparatively late in life (*viz.*, in Mammalia, never before the close of intrauterine development), and in order to finally show that such effects are not transmitted they should be produced as early as possible in the life of the parent. Such facilities are offered by Lepidoptera, for their

larvæ have been correctly described as "embryos leading an independent life," and the morphological interval which separates this stage from the two later stages is perfectly stupendous, completely dwarfing the differences between the latter into insignificance. Mr. Poulton therefore considered that if after the systematic mutilation of a large number of larvæ there was no trace of the effects in any individual of the next generation, the result must be taken as strongly confirmatory of Prof. Weismann's view.

ANNUAL MEETING,

January 18th, 1888.

Dr. David Sharp, M.B., F.Z.S., President, in the chair.

An abstract of the Treasurer's accounts for 1887 was read by Mr. H. T. Stainton, one of the Auditors.

Mr. H. Goss, one of the Secretaries, read the following:—

Report of the Council for 1887.

In accordance with the Bye-Laws the Council beg to present the following Report:—

During the year 1887 one Fellow (Mr. Logan) has died; four Fellows have resigned, *viz.*, Mons. Jekel, Major Lendy, Mr. Parkinson, and Mr. Percy Wormald; and twenty have been elected. The number of Fellows elected during the year, although small in comparison with the number elected in 1886, is above the average. At the same time the Society is in need of a larger number of members to enable it to publish more papers, and in other ways to advance its interests and promote its objects; and the Council earnestly hope that the Fellows will do their utmost to induce their friends to join the Society.

At the present time the Society consists of an Honorary Life-President, 10 Honorary Fellows, 43 Life Fellows, and 242 paying the Annual Subscription, making the total number

of Fellows now on the Society's list 296, which, after allowing for the losses by death and resignation, is an increase in number of 15 since the date of the Annual Meeting last year.

The Transactions for the year 1887 form a volume of 403 pages, containing 19 memoirs contributed by the following 16 authors, *viz.*, Miss Ormerod; Mr. F. Pascoe (2 papers); Mr. F. Galton, F.R.S.; Mr. F. Merrifield; Mr. P. Crowley; Mr. G. F. Mathew, R.N.; the Rev. T. A. Marshall, M.A.; Mr. G. T. Baker (2 papers); Lord Walsingham, F.R.S.; Mr. C. O. Waterhouse; Mr. E. Meyrick, B.A. (2 papers); Mr. E. B. Poulton, M.A.; Mr. W. L. Distant; Mr. J. B. Bridgman; Mr. T. L. Casey; and Mr. H. J. Elwes. Of these 19 memoirs 11 relate to Lepidoptera (or to enquiries in which Lepidoptera were the subjects of experiment), 4 to Coleoptera, 2 to Hymenoptera, 1 to Hemiptera, and 1 to Diptera. The memoirs above referred to are illustrated with 12 plates, of which 9 are coloured. The Society is indebted to Mr. Pascoe for plates 1, 2, and 11; to Mr. Crowley for the drawing of plate 3; and to Lord Walsingham for the drawing and printing of plates 7 and 8.

The Proceedings,—containing an account of the exhibitions and discussions at the Meetings, in addition to several papers not published in the Transactions,—extend to over 60 pages.

The financial position of the Society compares favourably with that of previous years, the year 1886 being of course excepted. The differences between the Society's receipts in 1887 and 1886 can be shortly explained as follows:—In 1886 the Society elected 56 Fellows (35 new, and 21 former Subscribers), whose united entrance-fees amounted to £117 12*s*. During the year 1887 the Society has, as before stated, only elected 20 new Fellows, and consequently has only received £42 in entrance-fees.

During the past year upwards of 250 Books, Pamphlets, Journals, and Papers have been added to the Library; the Meetings have been better attended than in any previous year of the Society's existence; there has been a steady increase in the number of persons elected Fellows; and, although the Balance in hand is small, two Compositions have been

invested, and consequently the Society's Capital has increased by £31 10*s.* since the last Annual Meeting. On the whole, therefore, the Council have reason to be satisfied with the progress made by the Society during the year 1887.

The following is an Abstract of the Receipts and Payments during 1887 :—

RECEIPTS.

	£	*s.*	*d.*
Balance in hand 1st Jan., 1887	14	1	10
Contributions of Fellows	322	7	0
Sale of Publications	62	12	6
Donations	15	10	0
Interest on Consols	10	12	1
	£425	3	5

PAYMENTS.

	£	*s.*	*d.*
Rent, Office Expenses and Salary to Assistant-Librarian	128	8	8
Printing	156	13	3
Plates, &c.	86	19	8
Books, Binding, &c.	12	17	3
*Balance	40	4	7
	£425	3	5

* Of this Balance £8 14*s.* 7*d.* remains in hand, and £31 10*s.* has been invested.

11, Chandos Street, Cavendish Square, London, W.,
January 18th, 1888.

The Secretaries not having received any notice proposing to substitute other names than those in the lists prepared by the Council, the following Fellows constitute the Council for 1888 :—Henry J. Elwes, F.L.S.; the Rev. Canon Fowler, M.A., F.L.S.; Herbert Goss, F.L.S.; Ferdinand Grut, F.L.S.; Sir John Lubbock, Bart., M.P., F.R.S.; Robert McLachlan, F.R.S.; P. Brooke Mason, M.R.C.S., F.L.S.; Edward B. Poulton, M.A., F.L.S.; Osbert Salvin, M.A., F.R.S.; Edward Saunders, F.L.S.; Dr. David Sharp, F.Z.S.; Henry T. Stainton, F.R.S.; and Lord Walsingham, M.A., F.R.S.

The following are the officers elected :—*President*, Dr. David Sharp; *Treasurer*, Mr. Edward Saunders; *Secretaries*, Mr. Herbert Goss and the Rev. Canon Fowler; *Librarian*, Mr. Ferdinand Grut.

The President then delivered an address, at the conclusion of which Mr. McLachlan proposed a vote of thanks to Dr. Sharp for his services as President during the year, and requested that he would allow his address to be printed with

the Proceedings. The proposal was seconded by Mr. F. Pascoe, and carried unanimously. The President returned thanks.

Mr. Kirby proposed a vote of thanks to the Treasurer, Secretaries, and Librarian, which was seconded by Mr. Waterhouse, and carried unanimously. Mr. Saunders, Mr. Goss, Canon Fowler, and Mr. Grut made some remarks in acknowledgment.

A vote of thanks to the Council was proposed by Mr. Waterhouse, seconded by Mr. White, and carried. Mr. Stainton replied.

Abstract of Receipts and Payments for 1887.

Receipts.	£	s.	d.
Balance 1st Jan., 1887	14	1	10
Subscriptions ,,	225	15	0
Entrance Fees ,,	37	16	0
Arrears ,,	27	6	0
Compositions ,,	31	10	0
Donations ,,	15	10	0
Transactions (Sale of)	62	12	6
Interest on Consols -	10	12	1
	£425	3	5

Payments.	£	s.	d.
Rent, Salary to Assistant-Librarian, Library & Expenses	128	8	8
Printing - - -	156	13	3
Plates, Colouring, &c. -	86	19	8
Books, Binding, &c. -	12	17	3
Investments - -	31	10	0
Balance in hand	8	14	7
	£425	3	5

ASSETS.

	£	s.	d.
Subscriptions, considered good - - - - - - -	10	10	0
Consols, £395 9*s.* 4*d.* - - - - - - (cost)	377	4	0

LIABILITIES.

(None.)

Examined and found correct,
January 11th, 1888.

H. T. Stainton.
J. Jenner Weir.
R. McLachlan.
N. P. Fenwick.
Sydney T. Klein.

THE PRESIDENT'S ADDRESS.

Gentlemen,

You will no doubt agree with the Council in considering the Report they have presented to you, as well as that of the Auditors, to be on the whole satisfactory. That we have a balance of a few pounds in hand, and that our invested money has increased from the small sum of £365 to the rather less small sum of £395 is satisfactory, inasmuch as it shows that your Treasurer and Council have been prudent, and have kept you quite free from financial embarrassment. But I am sorry to say this has only been accomplished by a sacrifice you will unanimously regret: we have deferred till 1888 expenditure that we wished to make—that we ought to have made—in 1887. You will, no doubt, have noticed that Part IV of the volume of our 'Transactions' for the year is unusually small: this is due not to the lack of scientific matter but to insufficiency of pence; and we greatly regret having been obliged to defer till the volume for 1888 the papers read in 1887 by Prof. Westwood, Messrs. J. Edwards, A. G. Butler, F. Merrifield, and Gervase Mathew. The publication of good papers being one of the most important functions of our Society, it is greatly to be wished that the number of its Fellows should increase, as only by this means can it be hoped to do what is required. A list of 300 names, especially including as it does a considerable number of foreign *savants*, is not a sufficient roll for the Entomological Society of London, and is far in arrear of that attained by some of the Entomological Societies of the Continent.

There is another point not mentioned in the Council's Report to which I think it well to draw your attention, and that is the heavy duties that fall on our Honorary Librarian,

Mr. Grut. You all know the efficient and courteous manner in which those duties are performed, but there is a saying that you should not flog a willing horse too hard, and we all feel that we ought not to work a librarian, who is both honorary and honoured, too inconsiderately. But our library is constantly increasing, and so, too, are the duties of the librarian, and the position is now such that we could not ask him to undertake any additional work; indeed that we would like, if possible, to relieve him of some of that he so faithfully does for us. Unfortunately our Bye-Laws give no power to appoint an honorary Assistant Librarian, as is done by the Entomological Society of France, and, if we wish to do so, it will be necessary to have a Special Meeting called with a view to altering the Bye-Laws.

That we should have lost only one Fellow by death during the year is a remarkable fact that we can expect only rarely to recur. Mr. R. F. Logan, whose loss we mourn, was for nearly forty years a member of our Society; he was an artist, residing near Edinburgh, and I understood, during the time I was myself at Edinburgh, that he was in delicate health, so that I did not make his acquaintance; and it was probably owing to this weakness that he did not take so conspicuous a place in Entomology as his early achievements in it promised for him; he, however, retained his interest in it till the last years of his life.

Death has also taken from us but few entomologists outside the ranks of our Society. I know of no others than the few of whom you will find obituary notices in the pages of the 'Entomologist's Monthly Magazine'; the most prominent being the Rev. John Hellins, so well known in connection with life-histories of British Lepidoptera; John Sang, who possessed considerable powers as a draughtsman; and Mr. Unwin, of Lewes. Outside our own country the names of only two that have disappeared call for mention: Pierre Millière, a lepidopterist of the South of France, who, like our own Hellins, was well known on account of his published observations of metamorphoses; and Max Gemminger, of Munich, to whom Entomology owes a hearty acknowledgment, for it is to him, in conjunction with von Harold, whose loss

we have scarcely ceased to mourn, that we owe that useful and laborious work, the Munich Catalogue of Coleoptera.

I propose to occupy your attention during the remainder of the time at our disposal this evening by some remarks on entomological collections.

In addressing an audience composed entirely of entomologists it is perhaps superfluous that I should enlarge on the value to society of these objects of our attention. We are fortunate in possessing a taste denied at present, it would appear, to the majority of mankind: we like to see insects, and admire their beauty, or be astonished at their wonderful diversity and the variations in the details of their structure, and this taste amply justifies to ourselves the formation of collections of the creatures we admire. But the Entomological Society of London, being the chief organisation of the kind existing in Her Majesty's dominions, is, or ought to be, recognised as an institution of public value; moreover, the sequel of my Address requires that I should not altogether ignore this point, and I shall therefore make some brief observations on it. The subject, however, is of such importance and extent that I cannot deal adequately with it; to do so would require literary and philosophical powers far beyond those I can bring to it, and far more time than is at our disposal this evening.

Without collections there could be no extensive discussion of entomological questions, no combination of investigations; they render possible the establishment of a nomenclature common to the men of science of different nations, and thus questions are discussed and conclusions established with the force derived from the fact that they have been subject to the criticisms of instructed men in all parts of the world.

Collections are standards of reference for nomenclature, and without a generally accepted set of names the extension and diffusion of knowledge to any considerable extent would be impossible. The saying, "Nomina si nescis perit et cognitio rerum," is perfectly true when applied to mankind generally, though it is not quite true in the case of a single individual.

Good collections of insects are a necessity for biological research. Even for the completion of those departments of biology that deal only with the structure and nature of the individual, they are of great importance; and for the wider departments of Natural History, such as variation, distribution, ancestry or origin, they are even more indispensable.

The question of the educational value of collections, both public and private, is so extensive that I must not attempt its discussion, particularly as there are special difficulties with regard to insects as to the mode and extent of their exhibition. But I may be permitted to remind you that they are one of those instruments of civilisation by which the thoughts of men are widened, and what an advantage it would be to all if this could be done more effectually; there is probably nothing that would do more to relieve the thousand natural shocks that flesh is heir to.

In this enormous city—the largest agglomeration of people in the world—where I am addressing you, it is of vital importance that every means of improving the mental, as well as the physical, condition of the people shall be thoroughly developed. Formerly the Spitalfields weavers used to amuse themselves by collecting insects: the growth of London, and more especially the extraordinary increase of value of property in its vicinity, is fast rendering any such occupation impracticable to this class of men; and boxes of insects, the private property of working men, are now, I suppose, nearly things of the past. But certainly something should be done by the resources of civilisation to replace this lost source of enjoyment. In a very beautiful passage in 'Frondes agrestes' Ruskin calls attention to the fact that even the magnificent surroundings of the mountain people of Switzerland are insufficient to develop or foster all the virtues of the human race. What then can we expect to be the character of the millions of inhabitants of the back streets of London.

There are many who are inclined to neglect Science, because they say it will not make men good. That may be so; nevertheless, it is undeniable that if scientific knowledge could be extended, even in a limited manner, to the mass of mankind, it would greatly increase their prudence, their

capacity for anticipating results, their knowlede of causation, their perception of the intricate and subtle manner in which what are apparently isolated facts or occurrences are really linked to others. No one will be found to deny that the possession and exercise of such faculties by the mass of mankind would make life more agreeable for themselves and for others, and there is fair reason for believing that in the course of generations it may help to make good conduct instinctive.

There are many—and in this many I fear we must include some scientific men—who would admit the force of these general considerations as to the value of science and of scientific collections to the public, but who would say, "But I do not see why we should trouble ourselves about insects; the other branches of science are sufficient; there are chemistry and physics and astronomy, and if you must concern yourself about living things surely the larger animals, whales, lions, elephants, ostriches, are sufficient for all practical purposes, and are nobler objects of study." To these ample answer might be made; but there is such a wealth of ignorance revealed in this opinion that it is impossible for me to delay to-night to expose it; and we may refer those possessing similar ideas to Kirby and Spence's 'Introduction to Entomology,' which is specially adapted for their perusal.

But it is certain that great as are the educational and economic value of the other branches of science to the community, Entomology is not inferior in these respects to any one of them, and, though there may be some practical difficulty in its use, it has some special advantages that must not be forgotten.

"Natura maxime miranda in minimis," said Linnæus: and yet the small size of the individuals is really the only cause for insects being so neglected, as they still are, by the bulk of mankind. The quantity of organic matter on the surface of our globe at any one time is but an unimportant fragment of the total matter, and probably has for long oscillated within small limits; by far the larger part of it is locked up in vegetable forms, which are certainly of the

greatest economical importance to man. But of animal forms the Arthropods are the most important, and it is even not improbable that, notwithstanding the comparative small size of the individual, the portion of the animal matter of the world invested in them is greater than that devoted to the Vertebrata : I say this with some hesitation, because it is exceedingly difficult for the imagination to form any adequate conception of the total amount of life in the waters of the globe ; but, leaving this out of consideration, it is highly probable that insects would actually outweigh the terrestrial Vertebrata ; their ubiquity, and the enormous numbers of their individuals and species, quite making up for the small size of the individual. Whether this may be the case or not it is at least certain that they are of enormous material importance to the human race, and this is so well known that I feel at liberty to do no more than mention the economic value of Entomology, and of collections in so far as they illustrate it.

Before quitting the first part of my subject I will ask you to recall to your minds the fact that the organisation of an insect is a very complex and perfect affair, and must have taken vast periods of time for its evolution, if it has been evoluted. It is equally complex and perfect,—I think even more perfect, take it as a whole, than that of the Vertebrata, —and Palæontology shows us that it is of equal or greater antiquity. These facts, then, *viz.*, the multitude of species, their advanced structure, their presence in large numbers in all parts of the world, their great antiquity, give them a predominant importance as objects on which to base considerations with regard to the distribution, variation, and origin of species, and from this point of view their small size becomes an advantage ; we can get together without difficulty ten thousand specimens of a beetle or a butterfly for comparison, but how could ten thousand elephants or lions or tigers be brought together ? The extreme variety in the modes of life, of vital activities and capacities, and of ontogeny in insects, render them of great value for statistical purposes, because the chances of error due to the existence of some unknown biological point are thus much diminished.

I must, gentlemen, again apologise to you not only for the desultory and imperfect nature of these remarks on the value of Entomology and entomological collections, but also for bringing before you considerations that to most of you are mere truisms, and ask you to excuse me by recollecting the wonderful ignorance of, the delightful contempt for, Entomology still exhibited in these so-called enlightened days by the mass of the community. This renders it necessary to iterate and reiterate again and again even the most elementary considerations.

If collections of insects are viewed as scientific instruments it is at once seen that they are valuable in proportion as they are complete, well-arranged, and accessible. I can say nothing to-night as regards the latter two points, but we will, if you please, consider the question of their state of completeness at present.

If we compare the extent and condition of entomological collections with what they were in the time of Linnæus and our own countryman Kirby about one hundred years ago, we are justified in entertaining a feeling of satisfaction: the progress that has been made, especially in the department of exotic Entomology, has been truly enormous.

Linnæus, when towards the close of his life he published in A.D. 1767 the twelfth edition of his memorable 'Systema Naturæ,' was acquainted with rather less than 3000 species of insects, of which over 2000 species were European, less than 800 extra-European. The number of species at present extant in collections can scarcely be less than 200,000, and may possibly be as many as 250,000, of which more than four-fifths are exotic. Although we may feel proud of such a result, this gives us no idea at all of the completeness of our collections; it justifies us in saying we have worked well, but how near are we to the end of our task?

There are, it is quite clear, no data from which a direct estimate can be formed as to the number of species now existing in the whole world. Such calculations have been made, but are not very trustworthy, for reasons that we need not at present stop to consider; but it may be said that the number of species of existing insects, though eminently uncertain, is certainly

enormous. Indeed, comparing the results obtained during the last century with those of the most recent collectors, it would seem that entomological collections are still in the infantile period of their existence. A very few years ago about 200 species of Coleoptera were known from Japan, and it was thought that there would be much in common between the insects of it and Europe. Mr. Lewis has discovered 4000 or 5000 species of beetles in the Archipelago, most of which were procured in two seasons, and the great majority of them are not only different from European species, but are absolutely new. Mr. Pryer has published lists, from which it would appear that Lepidoptera are also abundant there. I think we may put the number of species of Japanese Coleoptera therefore at about 8000, and the total number of Japanese insects of all orders at from 15,000 to 25,000 species of which we know at present less than 8000. In Central America equally astonishing results have been achieved by another of our Fellows, Mr. Champion; despatched thither by Messrs. Godman and Salvin for the purposes of their great work on the Natural History of the region, he succeeded in obtaining during four seasons fully 15,000 species of insects, of which more than half, probably nearly three-quarters, are new, and this although he did not exclusively confine himself to collecting insects.

Mr. Masters has just published a Catalogue of the described Coleoptera of Australia; these amount to about 7200 species; now we know, from the amount of country there that is still unexplored, and the fact that the obscure Coleoptera of Australia have been greatly neglected by collectors and describers, that this is only a small portion of its indigenous beetles; so that it is quite probable the Coleoptera of Australia may amount to 30,000 or 40,000 species, and the number of insects of other orders with which we are not acquainted must bring up the total to something prodigious.

Until quite recently it has been one of the commonplaces of Zoology that New Zealand was extraordinarily poor in insects; no prolonged or systematic entomological researches have yet been made there, but the sporadic efforts of a number of collectors have shown that this idea is quite erroneous; and I recently received from Mr. Helms about 25,000 specimens,

representing about 500 species collected in a single season in the environs of his residence at Greymouth, so that it would appear that beetles are as numerous in individuals and in species in New Zealand as they are in Europe.

It has also been thought that the scattered islands of the world have very little entomological fauna; that there is some truth in this idea is more than probable, but the recent researches of Wollaston in St. Helena, and of Blackburn in the Sandwich Islands, have shown that these islands have a considerable population of native insects, and that their comparative poverty is possibly largely due to recent extinction.

If such results have been obtained by a few skilful collectors in the localities they have explored, we may reasonably assume the same facts to hold good elsewhere. And there are still parts of the world where there exists an astonishing profusion of insect-life, of which we know very little indeed. On considering such facts there is, gentlemen, only one conclusion we can come to—our collections are lamentably incomplete. The species represented in them are certainly not one-fourth, probably not one-tenth of those existing in the world. It must, too, not be forgotten that the species we have obtained consist in a large degree of those that are most easily acquired: the forms that are first picked up in any locality naturally consist to a very large extent of the species that are most abundant; but afterwards discrimination as well as mere collection is required, and the task of collecting insects that are new or of real value is constantly becoming more arduous, and must continue to do so. The order Diptera is probably excessively numerous, but as the preservation of so many of the two-winged flies is a matter of much difficulty, extremely little has been accomplished in the way of obtaining a knowledge of the forms inhabiting the tropics.

It is evident, then, that we cannot relax our efforts; indeed the necessity for energy becomes still more evident when we consider the present position of affairs on the surface of the earth. The development of the means of locomotion by steam is perhaps the most practically important of the changes of the present century, and is undoubtedly creating a great alteration in the population of the surface of our globe. The European race is now establishing itself in many and distant

parts of the world, and wherever this is the case speedy and extensive changes are effected in the organic products of the spot. The forests are destroyed, the climate changed to a greater or less extent, and the delicately poised balance of life that may have existed with but slight oscillations for thousands of years is interfered with, and as the result profound though perhaps unnoticed changes take place in the Natural History, the effect invariably being that species that can but little tolerate changes become extinct. There is a chapter in Zoology that will always afford scope for the exercise of the imagination—the forms of animal life that have been extinguished by man without his having gained even a knowledge of their existence; they must already be numerous, probably very numerous; soon their number will be enormous, for the signs of the times are that the process of diffusion of the European races will continue, and, if that is the case, a large portion of the existing fauna and flora of the earth is doomed to extinction, and in all probability at no very distant date.

In the last 120 years we have acquired insects for our collections at the rate of about 2000 new species a year, and have thus obtained the most easily acquired one-tenth of the existing total; if, as these data indicate, it is to take us much more than 1000 years to complete our collections, we may feel only too sure that the task will never be accomplished, for a very large part of the more interesting and important forms will have been swept out of existence. In a letter I received from Mr. Pascoe a few weeks ago he mentioned that he was present at the spot now called Adelaide, when it was taken possession of by the British in the name of King William IV. Think of Adelaide as it is now, and of the geometrical ratio in which the population increases in Australia, and then reflect on what proportion of the present fauna of Australia will have ceased to exist in another century or two.

In the interest of future generations, as well as for our own satisfaction, we ought to work energetically at this enormous task, and it will soon be absolutely necessary to inquire what is the best way in which this can be done.

So far as I am aware there exists no society or other organisation for the purpose of discovering and preserving

such objects of Natural History as are not yet represented in museums or collections, and at present the general public takes apparently no interest in the matter of zoological exploration; probably, indeed, it is taken for granted that it is being done by those who understand that sort of thing. Thus the work is left entirely to private individuals, whose efforts, being uncombined and intermittent, can only be expected to produce partially satisfactory results. The difficulties in the case of insects are much increased by the fact that only those who have had some experience in the collecting and preserving of these small creatures will meet with many species, even in a country or district where they may be really abundant; everyone, indeed, who has attempted the formation of a collection of insects in our own country knows well the perseverance and skill that are required to obtain satisfactory results, and even yet we probably do not know all the species that are to be found in our own islands. Hence Mr. A. R. Wallace has suggested the appointment of resident naturalists in suitable districts abroad. We cannot at present, I think, afford to dispense with the efforts of what we may call pioneer naturalists,—travellers who pass more or less rapidly through a district, gathering and preserving such specimens as present themselves; still it is quite clear that their efforts cannot give results with which Science may rest contented. A combination of the two methods may not prove to be impracticable. It is probable that in many parts of the world there are missionaries, consuls, or men engaged in commerce who would be willing to collect, if they knew how to do it. Possibly the problem might be solved by one or two travellers who would visit selected districts, and not only themselves collect, but take special pains to instruct such residents as might be willing to learn how to collect and transmit specimens.

Another way in which we may husband our slender resources is by selection of localities. It is specially desirable that we should obtain those forms that are likely soon to become extinct,* and it is certainly on these spots that efforts

* On the subject of extinction *vide* the addresses delivered by Prof. Newton to the British Association, Glasgow and Manchester meetings.

should be first concentrated. South America, the greater part of Africa, China, and the larger mountain ranges of the world will be probably the same in a hundred years time as they are at present, but it is quite different in respect to islands and archipelagoes: the introduction of a pair of goats to an island may cause a revolution in its fauna, with the extinction of many most valuable forms; and the felling of forests in islands inflicts a fearful loss on the naturalist.

Thus, if we were to limit our efforts in the first instance to some selected spots, such as the smaller islands, the Galapagos, Sandwich, Fiji, Philippine, and West Indian archipelagoes, New Zealand, Tasmania, and Madagascar, we should probably, in the interests of the science of the future, be doing a wise thing; and it is most desirable that when the investigation of any of these spots is attempted it should be done thoroughly and exhaustively. This can only be accomplished by prolonged attention to special branches: thus I feel myself quite incredulous as to our being really acquainted with the beetles of the Galapagos, and I shall never be able to overcome my incredulity until a good collector of Coleoptera has spent a year there and the results are known. I think it is a public duty, due not only to the world at large, but to posterity, that we should investigate thoroughly the Natural History of the countries we have taken possession of; and I have no doubt, if we do so, future generations will be deeply indebted to us. If we neglect it they will say: "Those nineteenth century people destroyed the forests of many parts of the world in their haste to get wealth that they did not know how to use when they had acquired it, and the fauna of the globe became dreadfully impoverished, while scientific men were gravely discussing problems, the data for whose solution were not in their possession."

My remarks have referred chiefly to the acquisition of foreign insects and absolutely new species, but I must say a little about collections of British and European insects, for these also are very imperfect. There is no collection, so far as I am aware, of British insects that would enable any one to get really trustworthy and exhaustive information as to

the distribution of species throughout our islands, or the extent of their variation therein; and we cannot yet answer satisfactorily so elementary a question as to whether there are any species actually confined to their limits. A vast amount of enthusiasm and skill have in the last hundred years been devoted to the formation of collections of the insects of Britain and Europe, and I think the results are certainly not adequate to the efforts that have been made. The reasons for this are not difficult to find. Imperfect modes of preparation and preservation have much to do with it; and then each collector forms his collection for himself, and does it so that as his knowledge of it dies with him, the collection loses a large part of its value at his decease.

Bad collecting, so that the insects are in a deteriorated condition before being pinned; then deterioration resulting from the pins, the ravages arising from mites, mould, dust, and careless handling, so deteriorate an ordinary collection that at the close of a life-time the specimens are worth but little, and if there is no locality or date or other particulars attached to each specimen, the collection becomes of no general value whatever.

Isolated and imperfectly directed efforts are the chief reasons why there are no first-rate collections of British insects. This is a matter of importance, because after all, even in our own time and country, the collecting power in the community is but small, and it must be well directed if the maximum of result is expected from it.

You will have perceived from my remarks to-night that I attach much importance and value to collections. There are some who take a different view, and, perceiving that the ultimate object of collections is the information that can be obtained from them, say that attention is so much taken up by the formation of the collections that it is actually diverted from the questions the collections are formed to elucidate. There is, no doubt, truth in this view, but it is equally true that the larger questions of science can be answered only by the combined efforts of a number of generations; and, this being the case, each generation should accomplish that part of the work that is most needful at the moment, and at the present time, in consequence of the extension of the

European races, and the changes occurring on the face of the earth, there is probably no way in which we can so help the biology of the future as by the formation of collections.

Mr. Bates, in an address he delivered to this Society a few years ago, urged that the reason why entomologists frequently accompanied their papers by no interesting generalisations was that they perceived that the data are as yet too imperfect. And there can be little doubt that the instinctive tendency (if I may be allowed the use of such a term) of entomologists to occupy themselves largely with the formation of collections is on the whole and at present a wise one.

I say this with no view of discouraging other branches of entomological activity; indeed, if I did this, I should very much regret having delivered this Address. I have already alluded to the extreme importance of popularising and diffusing all the branches of Science; and there can be no doubt that observations of habits, of affinities, of anatomy, are, independent of their intrinsic value, important aids in encouraging collections by enlisting interest in the objects; while systematic and descriptive works are absolutely essential as a key to the intricacies of nomenclature and arrangement that are rendered inevitable by the vastness of the horde of the species of insects. We may, too, view with toleration, if not with approbation, a certain amount of speculative or imaginative Entomology, though I think we ought none of us to allow ourselves to indulge in it too freely, and we must not forget that it can scarcely be considered to be Science. In point of fact we are not yet in a position to give a positive decision on any of the great problems of biology; and perhaps it is well that this is the case. Were it otherwise we might be inclined to lament the fate of our descendants, who for the next thousand years would have no scientific occupation other than that of making collections and observations with the result of showing that their great-great-grandfathers were extremely clever, and knew everything: a discovery that the Chinese have already made, with intellectual results apparently very far from satisfactory—the highest mental effort of the educated Celestial being, they say, the admiration of Confucius.

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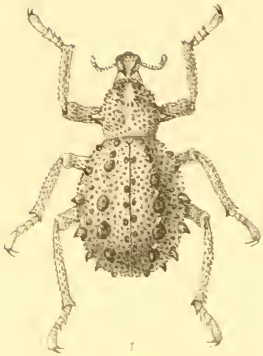

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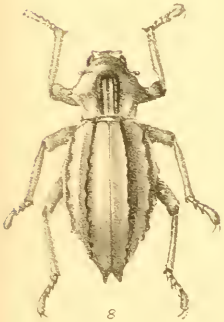

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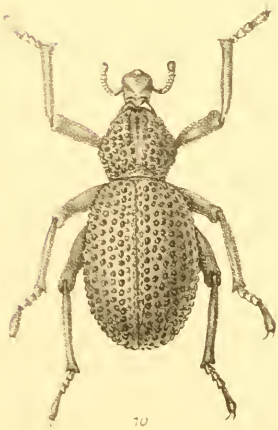

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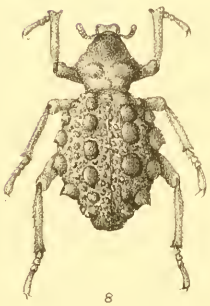

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A new Species of Synchloë.

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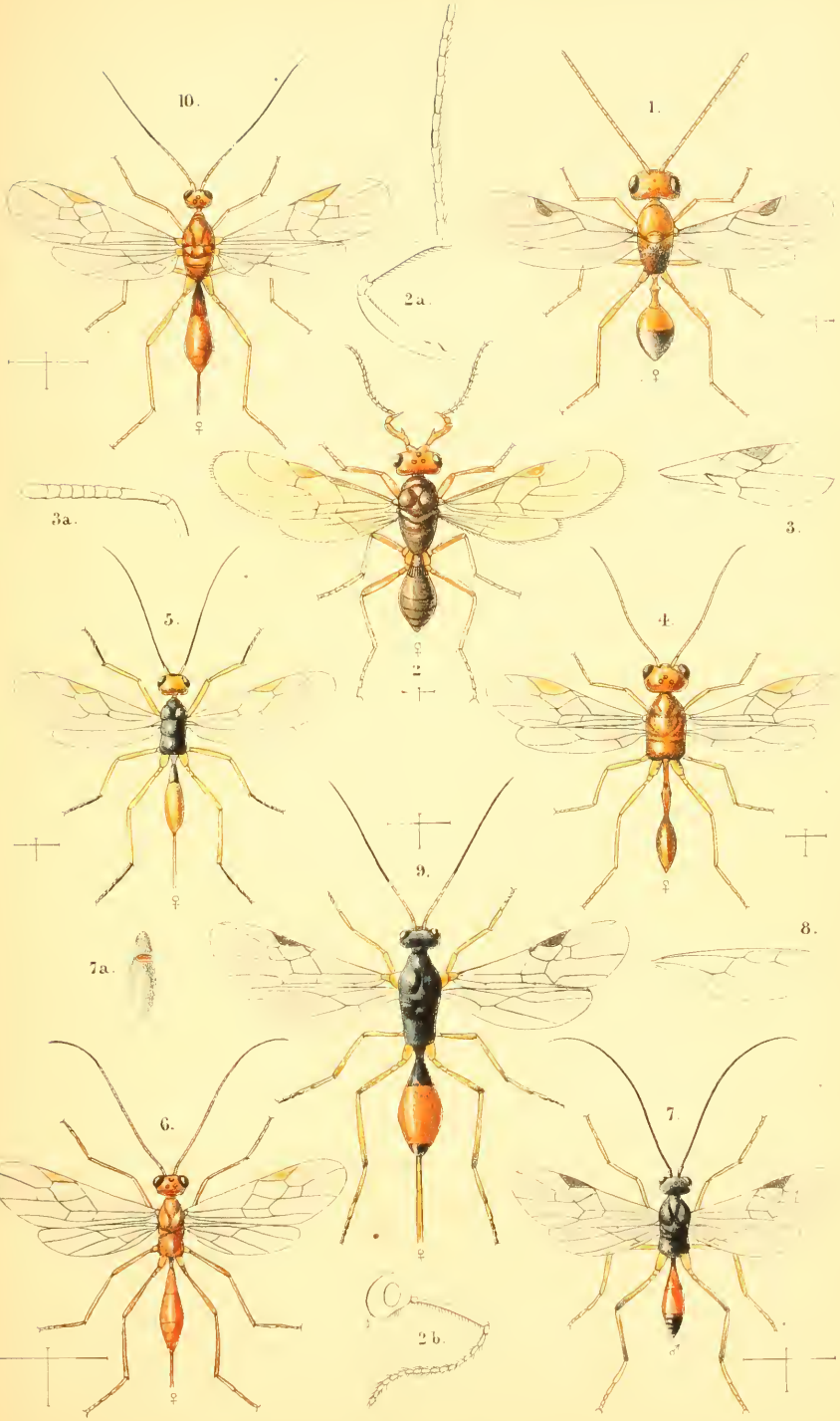

British Braconidæ.

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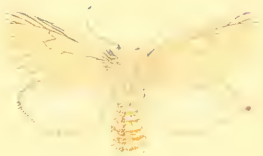

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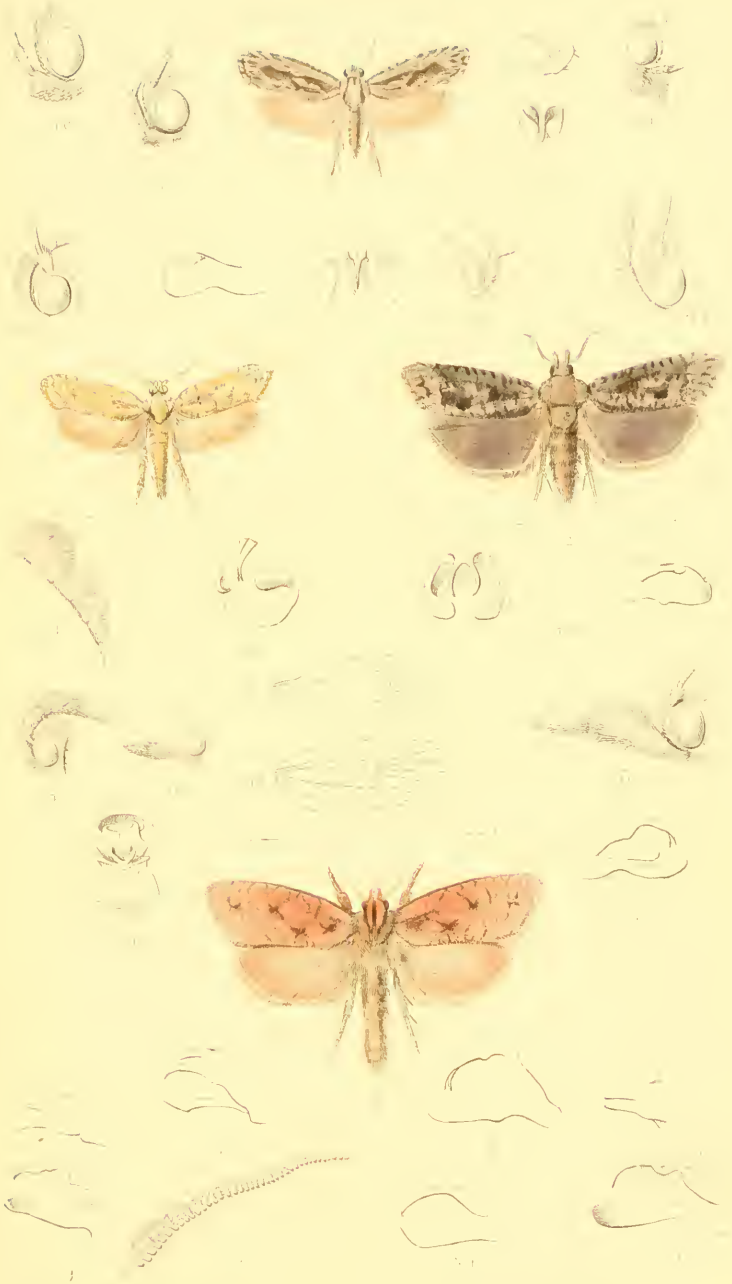
A new species of Carsus.



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A new genus of Erycinidæ

E. B. Poulton pinx.

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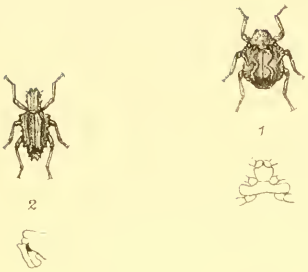

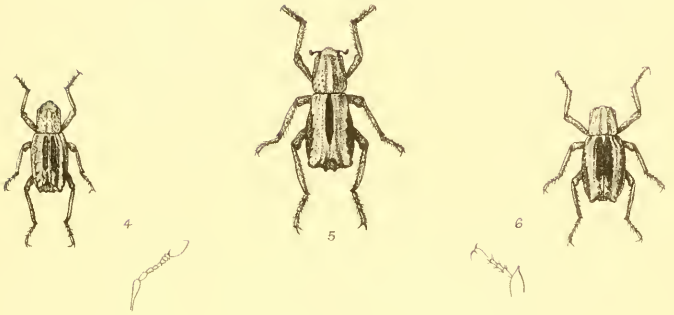

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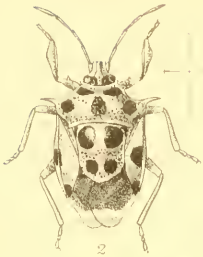

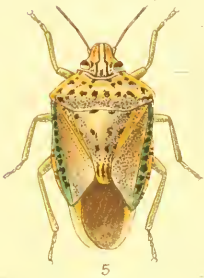

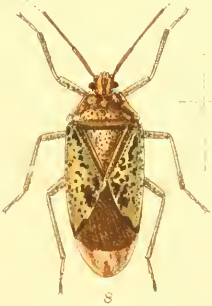

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New species of Oriental Rhynchota

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